

NDES GENERAL PERMIT 1200Z  
FILE NUMBER 104856  
MULTNOMAH COUNTY

STORMWATER POLLUTION CONTROL PLAN  
TUBE FORGINGS OF AMERICA, INC.  
5200 NW FRONT AVENUE  
PORTLAND, OREGON 97210

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*Contact Person:*

*Bill Park*

*(503) 820-2121*

*Prepared for*

**TUBE FORGINGS OF AMERICA, INC.**

*December 19, 2014*

*Prepared by*

*Anna St. John, R.G.  
Bridgewater Group, Inc.  
4500 SW Kruse Way, Suite 110  
Lake Oswego, OR 97035*

*Daniel Scarpine, P.E.  
Aquarius Environmental  
3204 NE 40<sup>th</sup> Avenue  
Portland, OR 97212*

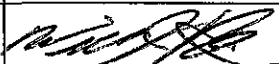
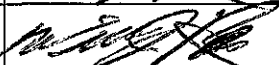

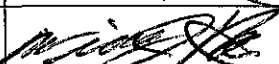


## REVISION SCHEDULE

This stormwater pollution control plan (SWPCP) is revised and updated to include modifications in site conditions, new or revised regulatory requirements, and additional on-site stormwater pollution controls. The prior versions are available from the facility's manager.

All revisions to the SWPCP are documented. The SWPCP Revision Documentation Form below records the date, author, and name/signature of the facility representative who authorized the revision. The signature of the authorized facility representative attests that the SWPCP revision information is true and accurate.

### SWPCP Revision Documentation Form


Revision Number	Revision Date	Revision Author	Facility Representative Signature
1	12/14/2006	Bill Park, TFA	
2	3/5/2012	Bill Park, TFA	
3	4/11/2012	Bill Park, TFA	
4	12/19/2014	Bill Park, TFA	
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6			
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8			
9			



## CERTIFICATION

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I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

  
\_\_\_\_\_  
Bill Park

12-19-14  
\_\_\_\_\_  
Date

Plant Manager



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## ACRONYMS AND ABBREVIATIONS

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AST	aboveground storage tank
BES	City of Portland Bureau of Environmental Services
CFR	Code of Federal Regulations
City	City of Portland
DEQ	Oregon Department of Environmental Quality
DMR	discharge monitoring report
mg/L	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
ORS	Oregon Revised Statute
OWS	oil/water separator
permit	NPDES stormwater discharge permit 1200-Z
SIC	Standard Industrial Classification
SSO	Site Safety Officer
SWPCP	stormwater pollution control plan
TFA	Tube Forgings of America, Inc.
USEPA	U.S. Environmental Protection Agency

# 1 INTRODUCTION

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## 1.1 Background

U.S. Environmental Protection Agency (USEPA) regulations (40 Code of Federal Regulations [CFR] 122-124) require National Pollutant Discharge Elimination System (NPDES) permits for certain municipalities and industries that discharge stormwater. The Oregon Department of Environmental Quality (DEQ) has created general NPDES permits for most of the industrial activities designated by Standard Industrial Classification (SIC) Code in the USEPA regulations. Coverage under one of these permits is required if a designated facility has a point source discharge of stormwater to surface waters.

DEQ issued an NPDES Stormwater Discharge Permit 1200-L to Tube Forgings of America, Inc. (TFA), in 1992. In 1997, the permit was reissued as a 1200-Z permit. On November 6, 2007, permit coverage was renewed for a new 1200-Z permit, which expires June 30, 2012. The permit is for light industrial facilities designated by SIC Code 3498 for fabricated pipe and fittings. Schedule A of the permit requires the preparation of a Stormwater Pollution Control Plan (SWPCP) for the facility. This SWPCP corresponds to the current permit conditions and site activities.

## 1.2 Purpose

The SWPCP is intended to prevent the release of contaminated stormwater from the site into the Willamette River. Releases are prevented through the development, implementation, and maintenance of appropriate stormwater pollution control measures.

The stormwater pollution control measures outlined in this SWPCP are intended to meet the requirements of Schedule A and subpart AA of Schedule E of the permit. If stormwater analysis indicates that permitted discharge benchmarks have been exceeded, a review will be conducted as required by the permit, and this SWPCP may be amended.

## 1.3 SWPCP Format

The format and content of the SWPCP is consistent with the criteria outlined in Schedule A and subpart AA of Schedule E of the permit and contains a site description (Section 2), a monitoring plan (Section 3), a description of stormwater controls (Section 4), and recordkeeping procedures and implementation schedule (Section 4.5).

A copy of the SWPCP is located on site in the office of the TFA's plant manager, Bill Park.

## 2 SITE DESCRIPTION

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### 2.1 General Location

TFA is located on approximately 14 acres in Section 19, Township 1 North, Range 1 East of the Willamette Meridian (see Figure 1). The site is approximately 0.5 mile north of State Highway 30 in Portland, Multnomah County, Oregon and is bordered on the north by McCall Oil and Chemical Corporation; on the east by CalPortland (formerly Glacier Northwest); on the west by NW Front Avenue and the south by Hampton Affiliates Reload Yard. The Willamette River is directly east of CalPortland and approximately 0.25 miles from TFA.

Land use within a one mile radius of the site is predominantly industrial. Site stormwater is primarily conveyed through a series of catch basins, manholes and existing storm sewer lines into the City of Portland's (City's) municipal stormwater sewer system which ultimately discharges to the Willamette River at Outfall 19 located approximately 0.5 miles south of the site. Stormwater from one area of the site discharges directly to the Willamette River through Outfall 1 (see Section 2.3 and Figure 2).

### 2.2 Industrial Activities

TFA is a manufacturer of precision welding fittings which are the elbows and tees that are connecting points in pipelines. The fittings are produced for a variety of uses including oil, chemical and power companies, water treatment and automobile plants, as well as high-rise buildings. The following sections describe industrial activities conducted at the site, including storage and use of significant materials, if any, that may be exposed to stormwater.

Figure 2 shows the facility layout. TFA's part of the property is occupied by an estimated 165,000-square-foot sheet-metal fabrication building, a 13,000-square-foot sheet-metal fabrication and storage building, and a 4,500-square-foot office building and associated parking immediately east of NW Front Avenue. The areas around the structures are paved with asphalt, except for the following: immediately south of part of the fabrication building, where pipe is stored and an overhead crane is present; along the east property boundary, where pipe, scrap metal, and finished product are stored; and along the southwest property where pipe is stored. A railroad spur and overhead crane are present south of the fabrication building. Pipe is delivered by rail or truck, temporarily stored south and east of the building, and remolded to specification by TFA.

Equipment used at the facility includes saws, torches, forges, presses and dies, bevels, forges, Rotoblast machines, grinders, and a paint dip tank and associated infrared dryer. The facility is supplied with process water by the City's municipal water supply.

The primary significant materials and industrial activities conducted at the TFA facility are outlined below.

### 2.2.1 Tube Manufacturing

All fabrication activities occur inside the buildings and are not exposed to stormwater. Low-carbon steel pipe is temporarily stored in a crane yard north of the office and along the north, south, and east sides of the building. Pipe is loaded onto band saws and cut to various lengths, depending on specifications. A water-based coolant is used in the saw area. Shavings and coolant are cleaned out of the saws and are separated by gravity. The shavings are recycled with other scrap metal; the coolant is recycled, and the washwater is discharged to the sanitary system. After the pipe is cut to specifications, it is prepped to form either elbows or tees. Residual steel shavings are blown out of the pipe in the blowout shack. The shavings are swept up and recycled with other scrap metal. The pipe sections are lubricated in a spray booth. A molasses-graphite solution is used as a lubricant on the dies and pipe in the elbow-forming process. Used motor oil (purchased from a local supplier) and graphite are used as lubricants on the dies and pipe in the process to form tees. The lubricated pipe sections are loaded onto presses using gas-fired furnaces and formed over mandrels using hydraulic presses into specific fittings (e.g., elbows, tees). Forklifts used to move equipment around the facility are powered by propane. Steel shot blast is used to descale parts in three shot blast machines.

The manufacturing of pipe fittings and cross sections involves the following processes:

- Pipe cutting - seamless pipes constructed of low carbon steel are loaded onto band saws and cut to specification.
- Pipe washing - pipe sections are loaded into metal tubs, transported to a wash yard, and rinsed clean of residual steel shavings.
- Lubricating - pipe sections are loaded into a spray booth where a lubricant (graphite, molasses and water mixture) is applied to the interior of the pipe sections.
- Forging - lubricated pipe sections are loaded onto presses using gas-fired furnaces and formed over mandrels using hydraulic presses into specific fittings (e.g., elbows, tees, etc.).
- Blasting - fittings are loaded into the blast where beads are used to blast the surface in order to remove any metal barbs and scales resulting from the forging process.
- Beveling – fittings are dry-machined with a weld-prep machine.
- Grinding - surface defects are removed from the exterior of the fittings through machine shop grinding.

- Painting - pipe fittings and cross sections are coated with water-based paint prior to storage and shipment.

Pipe washing and lubricating processes are conducted in areas outside of the fabrication building and may potentially impact stormwater (see Figure 2). Pipes cut to specification are transported to the asphalt-paved, wash area northeast of the Super 76 baghouse where the residual steel shavings are rinsed from the pipe with water. The rinse water flows to a lined catch basin (CB-8) adjacent to the wash area that discharges to the stormwater system. Steel shavings are removed from the catch basin and the liner is cleaned on a monthly basis.

The lubrication spray booth is on the north side of the elbow forge building (see Figure 2). The spray booth consists of a corrugated metal roof and is three-sided. During pipe lubricating, excess lubricant is collected in a sealed sump ("Lube Pit") in the spray booth for re-use. Excess water with residual lubricant is also collected in the sump beneath the spray booth and is recycled for the next lubrication cycle.

### 2.2.2 Storage

Approximately 50 percent of the site is used to store pipe, finished product, forging materials such as mandrels and tooling, and scrap metal (metal shavings and pipe). Approximately 41 percent of these areas are unpaved where precipitation infiltrates the ground, thereby reducing runoff to paved areas and the stormwater system. Pipe is stored in two unpaved pipe yards located in the west and southwest portions of the site. Pipe, finished product, mandrels and scrap metal (metal shavings in covered bins and scrap pipe) are stored in a large unpaved storage yard at the east side of the site. Finished product is also stored along the exterior of the fabrication building and inside the south side of the building adjacent to the loading bay.

### 2.2.3 Maintenance

All equipment maintenance and machine shop activities are conducted inside the fabrication building and are not exposed to stormwater (see Figure 2).

### 2.2.4 Hydraulic Oil

A 700-gallon hydraulic oil tank and 500-gallon used motor oil tank are located under a corrugated metal canopy on the east side of the fabrication building. The tanks are surrounded by a 6-inch, concrete, secondary containment berm (see Figure 2). A covered, containment trench is located inside the bermed area and does not connect to the existing storm sewer system.

### 2.2.5 Baghouses

During the blasting process, beads used to clean pipe are broken down into fine particulates. Bead and metal particulates are captured by an exhaust system in the blasting area and collected in baghouse filters. The particulates from the baghouse filters collect in a sealed and lined 55-gallon drum in secondary containment. The drums and secondary containment are covered.

### 2.2.6 Access Points and Parking

Two access areas are used for shipping and receiving. These areas are located on the south parts of the fabrication building. Employee parking is located along the west side of the facility next to NW Front Avenue.

### 2.2.7 Erosion, Sediment and Debris

Approximately 17 percent of the site is unpaved where precipitation infiltrates the ground, thereby reducing flow to paved areas and the stormwater system. Berms, concrete blocks, and/or coarse gravel filter strips transition between paved and unpaved areas are used to reduce the potential for sediment and small debris to flow from unpaved areas to paved areas and enter the storm sewer system. Section 4.1.4 discusses proper erosion and sediment control strategies.

### 2.2.8 Petroleum Hydrocarbons

All equipment maintenance is conducted inside the fabrication building (see Figure 2). Fuel and oil leaks may occur from heavy equipment used throughout the site. Drums of oils and other petroleum hydrocarbons are received on the east side of the building, temporarily stored under cover, and then transferred by forklift to a rack, in secondary containment, inside the building.

### 2.2.9 Spent Blasting Material

Spent blasting material (metal particulates) from the baghouse filters is collected in sealed and lined 55-gallon drums in secondary containment.

### 2.2.10 Lubricant

The mixture used for lubricating the interior of the pipe sections before forging consists of graphite, molasses and water. The pipe sections are sprayed inside the lubricating booth. Excess fluids accumulate in a sealed sump (Lube Pit) for recycling and reuse. The potential exists for lubricant to accumulate on the ground and contact stormwater outside of the booth.

### 2.2.11 Water from Oil/Water Separator

An OWS is located inside the fabrication building (see Figure 2). Overflow water from the OWS is temporarily stored in four 1000-gallon holding tanks until discharged to the sanitary sewer system pursuant to a City wastewater discharge permit.

## 2.3 Site Drainage

A site map shows drainage patterns, drainage areas, discharge points, impervious and pervious areas, potential pollution-generating activities, and existing erosion and sediment control measures (see Figure 2). Approximately 31 percent of the site is covered by building and 52 percent is paved. Approximately 17 percent of the site is unpaved where precipitation infiltrates the ground, thereby reducing flow to paved areas and the stormwater system. Berms, concrete blocks, and/or coarse gravel filter strips are used to reduce the potential for sediment and small debris to flow from unpaved areas to paved areas and enter the storm sewer system. For the purposes of this SWPCP, four stormwater drainage basins (DBs) have been defined based on the building locations and site topography.

The following provides a narrative description of each stormwater DB, including drainage patterns, stormwater conveyance structures, and corresponding discharge outfalls. Figure 2 depicts the drainage structures discussed in this section. TFA submitted a Stormwater Management Report (SWMR) with proposed plans to capture and convey stormwater from DB-1 through DB-3 to a proposed treatment train of oil/water separation and detention followed by active filtration and adsorption in November 2013. The system was installed in the summer of 2014 and has been operational since November 2014. The improvements re-route runoff from DB-3 (via West Lift Station) and DB-2 (via South Lift Station) to the conveyance system serving DB-1 and then into the treatment system.

**Drainage Basin 1 (DB-1)** comprises about 55 percent of the site and includes roof runoff from most of the fabrication and storage buildings, oil storage, baghouse operations, the lubrication spray booth, pipe and finished product storage, scrap metal storage, and an oil-water separator's (OWS's) holding tank for effluents produced from oil and water separating operations (see Figure 2). Approximately 25 percent of DB-1 is unpaved and used to store mandrels, pipe, finished product, and scrap metal (metals shavings in covered roll-off boxes and large scrap pipe); precipitation infiltrates the ground in this area, thereby reducing the amount of runoff to the stormwater system. Permanent concrete blocks are installed between some of the unpaved and paved areas to prevent possible sediment transport to paved areas. In addition, some paved areas in the eastern part of the site are graded to flow to unpaved areas and infiltrate the ground. A permanent berm has been constructed along the north property boundary to prevent stormwater run-on from or runoff to the neighboring property. In the paved areas, stormwater is directed to catch basins (equipped with oil-absorbent liners) and manholes located along the center line of the asphalt road. Once in the system, stormwater flows north and east via the existing underground storm sewer system to a OWS and Clarus LLC treatment system and then discharges to the Willamette River via Outfall 1 (WP-7) (see Figure 2).

**Drainage Basin 2 (DB-2)** comprises approximately 30 percent of the site and includes roof runoff from the fabrication building; two unpaved pipe storage areas; tooling, fittings and pipe storage areas; and employee parking. DB-2 is approximately 25 percent unpaved and precipitation infiltrates the ground, thereby reducing the amount of runoff to the stormwater system. A coarse gravel filter strip is present between the pavement and the unpaved pipe storage area in the southwest part of the site to increase infiltration and minimize the tracking of sediment onto the pavement by forklifts. Stormwater in paved areas is directed to manholes and lined catch basins along the west side of the fabrication building. Once in the system, flow is intercepted by a lift station manhole equipped with an overflow standpipe and submersible pump. The pump forwards flows to an installed manhole (which replaced an existing catch basin) by means of a 4-inch Schedule 40 polyvinyl chloride (SCH-40 PVC) force main and into the DB-1 conveyance system and the Clarus treatment system.

**Drainage Basin 3 (DB-3)** comprises approximately 13 percent of the site and includes roof runoff from the fabrication building, a non-contact cooling water tower (closed-loop system), a product storage area and employee parking lots. The entire drainage area is paved with asphalt or covered by the fabrication building and flow is intercepted by a lift station manhole equipped with an overflow standpipe and submersible pump. The pump forwards flows to an existing manhole connected to the DB-2 drainage system which then connects to the DB-1 conveyance system and the Clarus treatment system.

**Drainage Basin 4 (DB-4)** comprises about three percent of the site and includes one paved pipe storage area, paved employee parking, and an administrative office. Stormwater is directed to the west via the storm sewer system and discharges to the City's municipal stormwater sewer system to manhole C-4, which is equipped with a Contech StormFilter SF filtration system and ultimately discharges to the Willamette River via City Outfall 19. This drainage basin was created when the new administrative office was constructed in June 2006.

## 2.4 Impervious Surface Area

Eighty-three percent of the property is covered by buildings or is paved with asphalt. Seventeen percent of the property is unpaved and precipitation infiltrates the ground in these areas thereby minimizing flow to impervious surfaces and runoff to the stormwater system. Pervious areas are located in Drainage Areas 1 and 2 (see Figure 2).

## 2.5 Potential Pollutants

Table 1 summarizes pollutant sources and pollutants that may be present in the stormwater discharge as a result of fitting manufacturing activities.

Table 1  
Potential Pollutants

Potential Pollutant Source	Drainage Area
Low carbon steel shavings (suspended solids, metals)	Area 1
Raw material storage (steel pipe)	Areas 1 through 3
Mandrels and scrap metal (steel shavings and pipe)	Area 1
Finished product (including painted steel fittings)	Area 1
Sediment and debris (suspended solids)	Areas 1 through 4
Oil and Grease	Areas 1 through 4

## 2.6 Receiving Water

The stormwater from DB-1 through DB-3 is conveyed through the existing stormwater sewer system across the CalPortland facility and discharges directly to the Willamette River via private outfall WP-7 (see Figure 2, C-5). Stormwater from DB-4 discharges to the City's municipal stormwater sewer system which discharges to the Willamette River via City Outfall 19 (see Figure 2, C-4). Impairment pollutants for this reach of the Willamette River include: aldrin, DDT, dieldrin, pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and total iron (<http://www.deq.state.or.us/wq/assessment/rpt2010/search.asp>).

## 3.1 Monitoring Activities

Since 1995, TFA has performed stormwater monitoring activities according to the requirements of a 1200-L (and then 1200-Z) permit first issued in 1992.

### 3.1.1 Visual Monitoring

Visual observations for floating solids, oil/grease sheen, color, foam, and debris will be made monthly at manhole C-1 through C-5 and all catch basins. Visual monitoring consists of lifting the access manholes for C-1 through C-5 as well as the grates of the catch basins and visually inspecting the stormwater for floating solids, color, foam, debris, and oil and grease sheen. These observations will be recorded. No water is collected to perform the visual monitoring. Results of visual inspections are recorded on the Monthly Visual Observations Log (see Appendix C).

In addition, areas where industrial materials or activities are exposed to stormwater and areas where BMPs are located will be inspected on a monthly basis (see Section 4.3.1).

### 3.1.2 Stormwater Monitoring Program

Stormwater samples will be collected from manhole C-5. Stormwater quality monitoring activities will be performed four times per year, at least 14 days apart and during the first 12 hours of a stormwater discharge event at manhole C-5. Two grab samples will be collected from the manhole between July 1 and December 31, and two samples from the manhole between January 1 and June 30.

Drainage Basin 4 was created in 2006 when the new office was constructed. This area represents only three percent of the site and primarily receives runoff from employee parking areas and one pipe storage area. The discharge manhole to the City's line, C-4, is also equipped with a StormFilter treatment unit. In 2007, following an annual facility inspection, the City concluded that monitoring at this location was not necessary because this drainage area was not an area of industrial activity.<sup>1</sup>

Analytical parameters are specified below. For each point-source discharge of stormwater (outfall) to be monitored, the analysis listed below will be performed (with associated benchmarks and sampling frequency shown):

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<sup>1</sup> 2007. City of Portland Bureau of Environmental Services. Letter (re: Stormwater facility inspection, April 10, 2007) to B. Park, Tube Forgings of America, Inc., from, T. Dean, City of Portland. April 11.

Parameter	Benchmark	Frequency
<b>Statewide Benchmarks</b>		
Total copper	0.020 milligrams per liter (mg/L)	4 X per year each year
Total lead	0.040 mg/L	4 X per year each year
Total zinc	0.12 mg/L	4 X per year each year
pH	5.5–9.0 Standard Units	4 X per year each year
Total suspended solids	100 mg/L	4 X per year each year
Oil & Grease	10 mg/L	4 X per year each year
<b>Additional Pollutants</b>		
Total cadmium	0.001 mg/L (MQL)	4 X per year first 3 years
Total nickel	0.01 mg/L (MQL)	4 X per year first 3 years
Total chromium	0.0004 mg/L (MQL)	4 X per year first 3 years
<b>Impairment Pollutants for Willamette River</b>		
Aldrin	0.003 mg/L	2X per year each year
DDT	0.0011 mg/L	2X per year each year
Dieldrin	0.0025 mg/L	2X per year each year
Pentachlorophenol	0.02 mg/L	2 X per year each year
Polynuclear Aromatic Hydrocarbons (PAHs)	0.001 mg/L – Fluoranthene 0.002 mg/L	2 X per year each year
Polychlorinated biphenyls (PCBs)	0.002 mg/L	2 X per year each year
Total iron	1.000 mg/L	2 X per year each year
<b>Sector AA Specific Benchmarks</b>		
Total iron	1.000 mg/L	4 X per year each year
Total aluminum	0.75 mg/L	4 X per year each year
Nitrate plus nitrite nitrogen	0.68 mg/L	4 X per year each year
MQL = Minimum quantification limit is not a benchmark, but is the minimum concentration level that the sample must be analyzed to by the laboratory.		
Year = Water year from July 1 – June 30 of the next year.		

## 3.2 Benchmark Exceedances

### 3.2.1 Tier I Corrective Actions

If stormwater sampling results exceed any of the benchmark values in Schedule A.9, sector specific benchmarks in Schedule E of the Permit, or reference concentrations for impairment pollutants identified in the Permit assignment letter, TFA will, within 30 days of receiving the sampling results:

- Investigate the cause of the elevated pollutant level(s)
- Review the SWPCP (i.e., are source control measures, spill prevention and response procedures, preventative maintenance, and employee education procedures being followed)
- Are background or natural conditions causing the exceedances
- Are additional site controls needed to address the exceedances

TFA will document the results of this Tier I review. If TFA determines that SWPCP revisions are necessary based on the corrective action review, the revised pages will be submitted to the City (serving as the DEQ's agent). The review will describe the corrective actions that will be taken and an implementation schedule. A Tier I corrective action report will be retained on site for possible submittal to the DEQ or City upon request.

If natural or background conditions are suspected to be the cause of the exceedance, the Tier I corrective action report will propose a sampling plan and methodology for demonstrating this. If City accepts the demonstration of background or natural causes for an exceedance, a second demonstration is not required during the term of the permit.

Tier I corrective action reports will be prepared in compliance with condition A.10 of the Permit and will be filed as an addendum to this plan in TFA files.

### 3.2.2 Tier II Corrective Action based on 2<sup>nd</sup> Year Geometric Mean Benchmark Evaluation

In accordance with the 1200-Z permit Schedule A, Condition 11, TFA has designed a Tier II Corrective Actions Response as a result of exceeding the copper, zinc and total suspended solids (TSS) geometric mean benchmarks in the second year of permit coverage. Specifically, TFA exceeded the TSS and copper benchmarks in outfall C-1 and the zinc benchmarks in outfalls C-1 through C-3. The C-1 TSS geometric mean was 121 milligrams per liter (mg/L) and the copper geometric mean was 0.027 mg/L. The zinc geometric means for C-1 through C-3 are 0.379 mg/L, 0.157 mg/L, and 0.714 mg/L, respectively. These discharges will require reduction of TSS by 75 percent, copper by 62 percent, and zinc by 76 percent, to meet the benchmarks.

Appendix A contains the Tier II Stormwater Treatment Plan/Corrective Action Checklist and Response which describes the treatment controls that were installed at TFA in the summer of 2014 to meet the benchmarks. Although no exceedances were measured in late 2014, if exceedances were to continue, TFA will evaluate whether the treatment system is working properly and submit a summary of these findings in a Tier II Benchmark Exceedance report with the Discharge Monitoring Report (DMR) Form.

### 3.2.3 Monitoring Waiver

If the benchmarks listed in the stormwater permit are met (or if exceeded parameters have been due to natural or background conditions as described in Schedule B.4 of the Permit) for at least four consecutive stormwater monitoring events, a written request may be submitted to DEQ or City BES requesting a cessation of monitoring for the remainder of the permit term. Visual observations will be continued.

### 3.2.4 Sampling Variance

A sampling variance for missed samples may be requested if:

- State or federal authorities declared the year a drought year
- TFA demonstrates that rainfall in the area of the facility was 20 percent or more below the three-year-average rainfall for the area
- TFA demonstrates that samples could not be collected because of the infrequency of storm events of sufficient magnitude to produce runoff.

## 3.3 Monitoring Reporting Requirements

An annual stormwater monitoring report with the DMR is due on July 31 of each year.

### 3.3.1 Monitoring Data

Grab sampling results and monthly visual monitoring results for the previous monitoring period (July 1 through June 30) will be submitted. The minimum detection levels and analytical methods for the parameters analyzed will be reported. Non-detections will be reported as “ND” with the detection limit in mg/L in parentheses. In calculating averages, one-half of the detection limits will be used for non-detections.

### 3.3.2 Report Forms

Data will be submitted on DEQ-approved DMR forms for analytical monitoring results.

### 3.3.3 Report Submission

The annual report will be submitted to the City as follows:

Mr. Tim Dean City of Portland—Industrial Stormwater Program 6543 N Burlington Avenue Portland, Oregon 97203-5452
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Telephone: (503) 823-5537

Electronic mail: tim.dean [@portlandoregon.gov](mailto:tim.dean@portlandoregon.gov)

# 4 SITE CONTROLS

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This section discusses narrative technology-based effluent limits in Schedule A and Subpart AA of Schedule E of the permit, including stormwater management, spill prevention and response procedures, preventive maintenance, employee education, recordkeeping, and plan review requirements, that must be met as conditions of the permit.

## 4.1 Stormwater Management

The contact of stormwater runoff with pollutant-generating materials can be limited, using stormwater management practices such as minimizing exposure via containment and covered storage, oil and grease control or separation, prompt waste chemical and material disposal, erosion and sediment control, debris control, minimization of dust generation and vehicle tracking of industrial materials, and housekeeping.

Effective installation and maintenance of existing and recommended pollution controls will determine their effectiveness during rain events. The BMPs discussed in the following sections will be modified as new BMPs are developed or improved, and when site activities or regulatory requirements change. Management controls appropriate for any additional industrial activities or significant materials use and storage are implemented when the activity occurs.

### 4.1.1 Minimize Exposure

All fabrication activities occur inside buildings or under cover eliminating exposure to precipitation and runoff.

Waste oils, paints, lubricants, antifreeze, motor oil, hydraulic oil, gear lube and transmission fluid, are stored inside buildings or beneath a canopy in secondary containment to prevent contact with stormwater.

The hydraulic oil and used motor oil tanks on the east side of the machinery area are covered with a canopy and equipped with a 6-inch concrete secondary containment berm to prevent spills from contacting stormwater.

The drum storage area on the east side of the fabrication building is covered with a canopy. Graphite, Frigidol, band saw fluid and other materials are stored inside a containment pallet under this covered area.

The lubricating spray booth east of the baghouse is mostly enclosed and covered. Water and lubricant (molasses and graphite) are directed to a sealed sump for recycling and reuse.

Bins containing dry steel shavings are covered to prevent contact with stormwater; these bins are located in an unpaved area where any precipitation infiltrates the ground.

Diversion structures such as concrete blocks and berms are used to reduce stormwater contact with industrial activities such as lubricating pipe sections, pipe washing, baghouse operations, and drum storage. Diversion structures have been constructed away from transportation routes.

#### 4.1.2 Oil and Grease Control or Separation

Oil and water separation units are installed at the facility to reduce the potential for oil-contaminated water to enter sanitary or storm sewers. The OWS inside the fabrication building handles water collected from the de-greasing and washing of equipment parts. The water from the separator is pumped to tanks outside and adjacent to the building. Water from the holding tanks discharges to the City's sanitary sewer system pursuant to a wastewater discharge permit.

An OWS is present in the treatment train of the Clarus LLC stormwater treatment system that was installed in the summer of 2014. The OWS is a precast concrete vault that utilizes a sediment weir followed by coalescing media to separate high and low density oils that are collected against an oil-retaining baffle. A submerged gap in the baffle allows for the treated water to pass through and into a discharge pipe to the active filtration and adsorption portions of the system followed by discharge to outfall C-5 and then a pipe to the Willamette River. The Operations and Maintenance Plan for the Clarus stormwater treatment system, including the OWS, is attached as Appendix B.

Catch basins have filters with oil-absorbent Storm Sentinel™ inserts. These inserts are inspected at least monthly, cleaned two times per year or more frequently as needed (except CB-8's liner which is cleaned monthly), and replaced as needed (see Appendix C: Preventive Maintenance Procedures, and accompanying forms).

#### 4.1.3 Waste Chemicals and Material Disposal

Waste oils are stored inside the building in a 2,600-gallon aboveground storage tank (AST) in the OWS room and a 500-gallon AST in Maintenance to prevent contact with stormwater. When the tanks are full, the oil is recycled offsite by a contractor. Used motor oil is purchased from an outside vendor and used as a lubricant in the fitting manufacturing process; the oil is stored in a 500-gallon AST under a covered and bermed area east of the building. Waste chemicals are handled, and stored within covered areas. Any residual paint solids from painting the pipe fittings are stored in an approved container inside the building pending offsite disposal. General solid waste and scrap metal (dry steel shavings) are placed in covered containers. Larger pieces of scrap metal (pipe) are temporarily stored in a pile in an unpaved area prior to offsite recycling. Disposal and recycling are completed following applicable regulations and waste handling service provider procedures.

#### 4.1.4 Erosion and Sediment Control

Inspection of the unpaved storage yards in Drainage Basins 1 and 2 during stormwater events indicates that rainwater pools and infiltrates the ground. Excess debris in these areas is removed, as necessary. Some paved areas are graded to flow to unpaved areas thus minimizing the flow of sediment to the stormwater system. Concrete blocks are installed between some paved and unpaved areas east of the main fabrication building and booms are installed around catch basins in high flow areas to minimize sediment loads to the stormwater system.

The floors inside of the fabrication buildings are power-swept on a regular basis to minimize potential tracking of particulates outside of the building.

Paved areas are power-swept/cleaned of sediment, debris, oil and grease at least weekly or more frequently as necessary, except when it is raining. Routine cleaning reduces the buildup of potential contaminants.

#### 4.1.5 Debris Control

Catch basins equipped with inverted elbows and grate covers are used to collect sediment and debris in stormwater runoff. The catch basin allows sediment and debris to settle to the bottom of the basin. The inverted elbow traps floating debris and allows stormwater to flow to the stormwater sewer system. Catch basins also have filters with oil absorbent inserts. These inserts are inspected at least monthly, cleaned two times per year or more frequently as needed (except CB-8's liner which is cleaned monthly), and replaced as needed (see Appendix B: Preventive Maintenance Procedures, and accompanying forms). Sediment is removed on an annual basis, except for catch basin 8 (near the pipe washing area) which is cleaned monthly. Cleanouts are performed before the rainy season begins.

#### 4.1.6 Dust Generation and Vehicle Tracking of Industrial Materials

Minimal dust is generated at the facility as a result of operations.

The floors inside of the fabrication buildings are power-swept on a regular basis to minimize potential tracking of particulates by forklifts outside of the building.

Paved areas are power-swept/cleaned of sediment, debris, oil and grease at least weekly or more frequently as necessary, except when it is raining. Routine cleaning reduces the buildup and tracking of potential contaminants.

Transportation routes into and out of unpaved are limited to one or two access areas to minimize potential vehicle tracking of metal particulates to paved areas. In addition, a coarse gravel filter trench is present at the exit from the unpaved storage area near the southern property boundary to minimize the tracking of sediment from unpaved to paved areas.

#### 4.1.7 Good Housekeeping

Good housekeeping includes the maintenance of clean and orderly facility areas to reduce the amount of possible pollutants from contacting stormwater. Good housekeeping includes the following:

- Metal fabricating and painting areas are located inside the fabrication building.
- All equipment maintenance is conducted inside the fabrication building.
- The floors inside of the fabrication buildings are power-swept on a regular basis to minimize potential tracking of materials by forklifts outside of the building.
- All hazardous chemical drums and waste oil tanks are stored in the building or in covered, bermed areas with secondary containment devices to prevent leaks and spills from entering stormwater runoff.
- Waste oils, paints, lubricants, antifreeze, motor oil, hydraulic oil, gear lube and transmission fluid, are used inside the building and stored inside buildings or beneath a canopy in secondary containment to prevent contact with stormwater.
- The hydraulic oil and used motor oil tanks on the east side of the machinery area are covered with a canopy and equipped with a 6-inch concrete secondary containment berm to prevent spills from contacting stormwater.
- The drum storage area on the east side of the fabrication building is covered with a canopy. Graphite, Frigidol, band saw fluid and other materials are stored inside a containment pallet under this covered area.
- Steel shavings are removed from the catch basin near the pipe washing area and the liner is cleaned on a monthly basis, or more frequently as necessary.
- The lubricating spray booth east of the Super 76 baghouse is mostly enclosed and covered. Water and lubricant (molasses and graphite) are directed to a sealed sump for recycling and reuse.
- Spent blasting material (metal particulates) from the baghouse filters is collected in sealed and lined 55-gallon drums in secondary containment and is not exposed to stormwater.
- Routine sweeping of high traffic areas, perimeters of unpaved storage areas, baghouse area, access points and finished product storage areas outside the warehouse to reduce the amount of debris and sediment that may enter the stormwater sewer system.
- Outdoor storage areas for raw metal and finished products are orderly and are free of conditions that could cause or impede spill response and cleanup. Transportation routes into and out of these areas are limited to one or two access

areas to minimize potential vehicle tracking of metal particulates to paved areas. In addition, some of these areas are separated from paved areas by concrete berms or filtration trenches between the paved and unpaved areas to minimize runoff and vehicle tracking to paved areas.

- Dry steel shavings are stored in covered containers in an unpaved area before offsite recycling. Larger scrap metal (pipe) is temporarily stored in a pile in an unpaved area to minimize runoff to paved areas before offsite recycling.
- Routine cleaning of catch basins and liners to remove accumulated solids and debris that may plug the stormwater system, including before the rainy season begins.
- Routine removal and replacement of oil absorbent pads and pillows, if applicable.
- Conducting routine inspections and maintenance of equipment and vehicles to prevent leakage of oil, grease, and fuels.
- Proper disposal of absorbent materials used in cleaning petroleum hydrocarbon spills.
- Cleaning before and during the rainfall season. Cleaning before the rainfall season prevents possible contaminant releases during the first-flush events of the rainfall season.

#### 4.1.8 Non-Stormwater Discharges

TFA has examined the stormwater collection and conveyance system for the presence of offsite stormwater run-on, and the presence of non-storm water discharges into the collection system. Potential offsite stormwater run-on from a neighboring property to DB-1 was eliminated by the installation of a permanent berm along the northern property boundary. No other non-stormwater-related discharges into the collection system were identified.

## 4.2 Stormwater Treatment

In November 2013, TFA submitted a building permit application including a Stormwater Management Report with proposed plans to capture and convey stormwater from all three industrial drainage basins to a proposed treatment train of oil/water separation and detention followed by active filtration and adsorption in order to address oils, total suspended solids, and heavy metals in site runoff. Based on vendor-supplied information, recent monitoring, the treatment system is capable of treating stormwater runoff in order to consistently meet Permit benchmarks. The system was constructed during the summer of 2014 and began operating in November 2014. See Appendices A and B for more information.

Stormwater was re-routed from DB-3 (via West Lift Station) and DB-2 (via South Lift Station) to the conveyance system serving DB-1 (see Figure 2). In DB-3, flow was intercepted by a lift station manhole equipped with an overflow standpipe and

submersible pump. The pump forwards flows to an existing manhole connected to the DB-2 drainage system. The lift station and existing manhole were connected via a 4-inch Sched 40 PVC force main. In DB-2, flow was intercepted by a lift station manhole equipped with an overflow standpipe and submersible pump. The pump forwards flows to an installed manhole (which replaced an existing catch basin) by means of a 4-inch Sched 40 PVC force main. Modifications to the DB-1 conveyance system route flow from all three catchments to the installed treatment system, to be returned to the existing storm drain post-treatment for discharge into the Willamette River. These modifications include an interceptor flow-splitting manhole to route flow to an installed oil/water separator (OWS) followed by an installed lift station manhole (North Lift Station) and force main to pump runoff to the surge tank and treatment system. See Figure 2 for the Facility and Site Drainage Plan and Figure 3 for the Stormwater Treatment System Schematic. Details of the improvements and O&M requirements are specified in Appendices A and B, respectively.

### 4.3 Spill Prevention and Response Procedures

Methods to prevent spills and cleanup and notification procedures are presented in this section. The Spill Notification Record and General Spill Response Procedures are found in Appendix D.

#### 4.3.1 Spill Prevention

Petroleum products are stored under cover and in secondary containment. Maintenance is performed inside the building. Spill kits are located in or near areas where spills may occur (e.g., used oil and new hydraulic oil storage, new oil drum storage) and near most catch basins. Catch basins are equipped with oil-absorbent liners.

Steel is used to manufacture pipe fittings. Pipe is stored in paved and unpaved areas that are orderly. Manufacturing activities occur inside the building or under cover with no discharges to the stormwater system. Metal working fluids and chemicals are stored inside the building and are not exposed to stormwater. Pipe lubrication occurs in a covered area and the materials used to lubricate pipe (molasses and graphite) are environmentally benign and are collected in a sealed sump and reused.

Diversion structures such as concrete blocks are used to reduce stormwater contact with industrial activities such as pipe storage areas, lubricating pipe sections, pipe washing, baghouse operations, and drum storage. Diversion structures have been constructed away from transportation routes. Concrete blocks are also located between some paved and unpaved areas to prevent the flow of sediment/metal particulates from unpaved to paved areas.

#### 4.3.2 Spill Response

The following spill cleanup equipment is maintained in the equipment maintenance area and near catch basins:

- Absorbent
- Sorbent booms and pads
- 55-gallon drums
- 9-mil plastic bags
- Shovels
- Personal protective equipment

Appropriate personnel are familiar with the spill cleanup equipment's location and use. Spill equipment is used only for emergency response to spills. The equipment is decontaminated or replaced immediately after use.

Spills are cleaned up immediately. If a spill poses a threat to the stormwater system, employees must immediately notify the Site Safety Officer (SSO) or his designee, who will assess the spill for the appropriate response:

- Small spills are managed on site with absorbent, which can contain and soak up liquids.
- Larger spills are managed by placing a sorbent boom or an earthen or chip dike around the spill and the nearest stormwater catch basin downgradient of the spill. The SSO or his designee assesses the site and contaminated material for other appropriate cleanup options.
- If the spill is on grass or soil, absorbent is used to cover as much of the spill as possible, and cleanup activities begin as soon as possible.

During the spill, site personnel work to prevent the incident from spreading to other areas of the site. If appropriate, the SSO or his designee temporarily stops facility operations to reduce the potential for further impact.

The following instructions for employees in a real or potential emergency situation are given to employees during annual training:

- Contact your supervisor as soon as a potential emergency is recognized.
- The SSO or his designee will be notified as soon as a potential emergency is recognized.
- The first emergency response person at the scene will immediately assess the potential hazard. If the situation is considered an emergency that cannot be controlled by on-site personnel, off-site spill response will be called (911). If the

emergency can be handled by site personnel, the response will be consistent with the following instructions.

- The SSO will direct on-scene management and emergency response.
- Depending on the severity of the incident, the SSO will notify the appropriate community response unit or state or federal agencies (see Section 4.3.3).
- The SSO will direct off-site spill response units to the scene and provide information about the facility.
- Potential ignition sources will be extinguished.
- Storm drains or ditches near spills will be plugged or diked.
- Suitable aisle and roadway space will be maintained to allow unobstructed entry of emergency response units.
- After the incident, the SSO or his designee is responsible for the proper handling and storage of spill equipment and disposal of any wastes.

#### 4.3.3 Spill Reports and Regulatory Notifications

The SSO or his designee reviews the cause of the incident, the response actions, the cleanup, and other pertinent issues or circumstances. This information is used to evaluate materials handling procedures, training requirements, and emergency procedures in case they need to be modified to reduce the chance of similar incidents reoccurring. The Spill Report (see Appendix D) is used to document the spill.

Oregon spill response and cleanup laws specifically include oil and petroleum products as hazardous substances. Oregon Revised Statute (ORS) 466.635 states: "Any person owning or having control over any oil or hazardous material who has knowledge of a spill or release shall immediately notify the Emergency Management Division as soon as that person knows the spill or release is a reportable quantity."

If the spill is into, or likely into, the waters of the state, the reportable quantity for oil and petroleum products is "...any quantity of oil that would produce a visible oily slick, oily solids, or coat aquatic life, habitat or property with oil" (ORS 466.605[10][D]). DEQ interprets this as any amount. For spills on land, a reportable quantity is any quantity of oil exceeding one barrel (42 gallons) (ORS 466.605[10][E]).

If a spill has impacted, or may impact, nearby surface water, the Environmental Engineer or his designee will immediately (within one hour) call the Oregon Emergency Management Division (800-452-0311), the City Spill Hotline (503-823-7180), and the National Response Center (800-424-8802). When reporting the incident, the following information will be provided:

- Name and telephone number of person reporting the incident

- Name and address of the facility
- Time, date, and duration of the incident
- Type of incident
- Quantity and type of hazardous material involved
- Number of persons, if any, exposed or injured
- Potential off-site hazards to human health or the environment

If required by the USEPA or the DEQ, a copy of the Spill Report will be sent to the USEPA regional administrator and the DEQ within 15 working days of the incident.

#### 4.4 Preventive Maintenance

Routine preventive maintenance is crucial to reducing the amount of pollutants discharged with stormwater runoff. Preventive maintenance includes inspections, repairs, and good housekeeping procedures.

The potential for spills is reduced by the following practices:

- Carefully transferring fuel and waste oil into site storage tanks
- Educating employees that "topping off" tanks causes spills
- Conducting equipment maintenance and truck repairs inside the fabrication building whenever possible to prevent spilled oil and grease from contacting stormwater runoff
- Maintaining equipment to reduce the number of fuel and oil leaks
- Storing and disposing of equipment oil and grease in proper containers
- Carefully loading and unloading drums into and out of the drum storage area

Stormwater control structures and areas of potential spills, such as the hydraulic and lube oil storage areas, drum storage, lubrication spray booth and lube pit, baghouse, and unpaved storage yards (sediment build up areas) are inspected monthly during the rainfall season.

A regular program of inspection, repair and cleaning of stormwater control structures and heavy equipment, as well as disposal and containment of low carbon steel shavings is conducted throughout the year. Solids in the catch basins are removed on an annual basis before the rainy season begins. The Preventive Maintenance Report and Checklist are found in Appendix B.

#### 4.4.1 Inspections

Areas where potential spills of significant materials could impact stormwater runoff are inspected on a monthly basis. At a minimum, the inspection includes visual observations of stormwater management features to determine the presence of floating and suspended material, oil and grease sheens, discolorations, turbidity, and odor. The Preventive Maintenance Form (see Appendix C) is used to record findings of monthly inspections.

The following routine preventive maintenance inspections occur for the existing BMPs at the site:

- Inspection of hydraulic, lube (used motor oil) and waste oil tanks and dispensing nozzles for damaged and cracked hoses, leaking valves, and secondary containment integrity.
- Routine inspection of the drums under the drum storage canopy for leaks or damage that may cause spills.
- Inspection of raw metal storage and finished product storage areas to confirm adequate access and no accumulated debris or migration of sediment from unpaved to paved areas.
- Inspection of scrap metal (steel shavings) storage containers to confirm that containers are covered and the area around the containers is free of debris and shavings.
- Inspection of asphalt pavement for accumulated debris and solids that could enter the catch basins.
- Inspection of the catch basins for sediment accumulation, oil sheens, debris and restricted water flow.
- Inspection of the baghouse areas for spilled materials and, if necessary, clean up as soon as possible.
- Inspection of the lubricating spray booth area and lube pit after usage for spilled material and, if necessary, clean up as soon as possible.
- Monitoring the water level in the steam-cleaning area OWS holding tanks.

#### 4.4.2 Repairs

A regular program of cleaning and repairing stormwater control structures maintains an effective stormwater conveyance system. The following section describes the cleaning and repair of site stormwater control structures.

After each major storm, the drainage areas are inspected for signs of sediment buildup or debris, excessive settlement or ponding, and other possible problems. The sediment or debris is removed, as appropriate, to ensure appropriate flow.

TFA personnel inspect the material handling equipment, forklifts, and catch basins on a monthly basis allowing for timely and cost effective repairs to equipment and stormwater control structures, if necessary. Repairs are conducted as needed. Typical repairs include:

- Repairing leaking hoses and valves on hydraulic and waste oil tanks and material handling equipment.
- Repairing leaking hoses and valves on the lubrication spray booth.
- Replacing damaged catch basin grate covers and liners.

## 4.5 Employee Awareness Program

TFA has an employee awareness program designed to inform personnel of the goals and components of the SWPCP, and to address spill response procedures, good housekeeping, and materials management practices. This training is provided to all employees. New employees receive stormwater orientation training within 30 calendar days of hire and at least annually thereafter. This program is implemented using presentations at safety meetings, signs and notices posted throughout the facility relating to housekeeping practices, and annual refresher training for employees on the use of the SWPCP and its components.

### 4.5.1 Goals of the SWPCP

The SWPCP's purpose is to outline stormwater control methods that will reduce pollutant transport from the site's activities to surrounding surface water bodies. The SWPCP is used by TFA to guide daily operations and evaluate future design and construction.

### 4.5.2 Components of the SWPCP

The employees are made aware of the SWPCP's four components:

- Introduction.
- Description of the site and site activities.
- Site controls, BMPs and preventative maintenance.
- Information about the general permit and the location of the plan and required record-keeping forms at the facility.

While the SWPCP may be updated, communication of the above four components of the SWPCP to personnel is not changed.

The SSO has made this plan available to site employees and coordinates the appropriate training for an on-site emergency response team for its proper implementation.

## 4.6 Recordkeeping and Internal Reporting Procedures

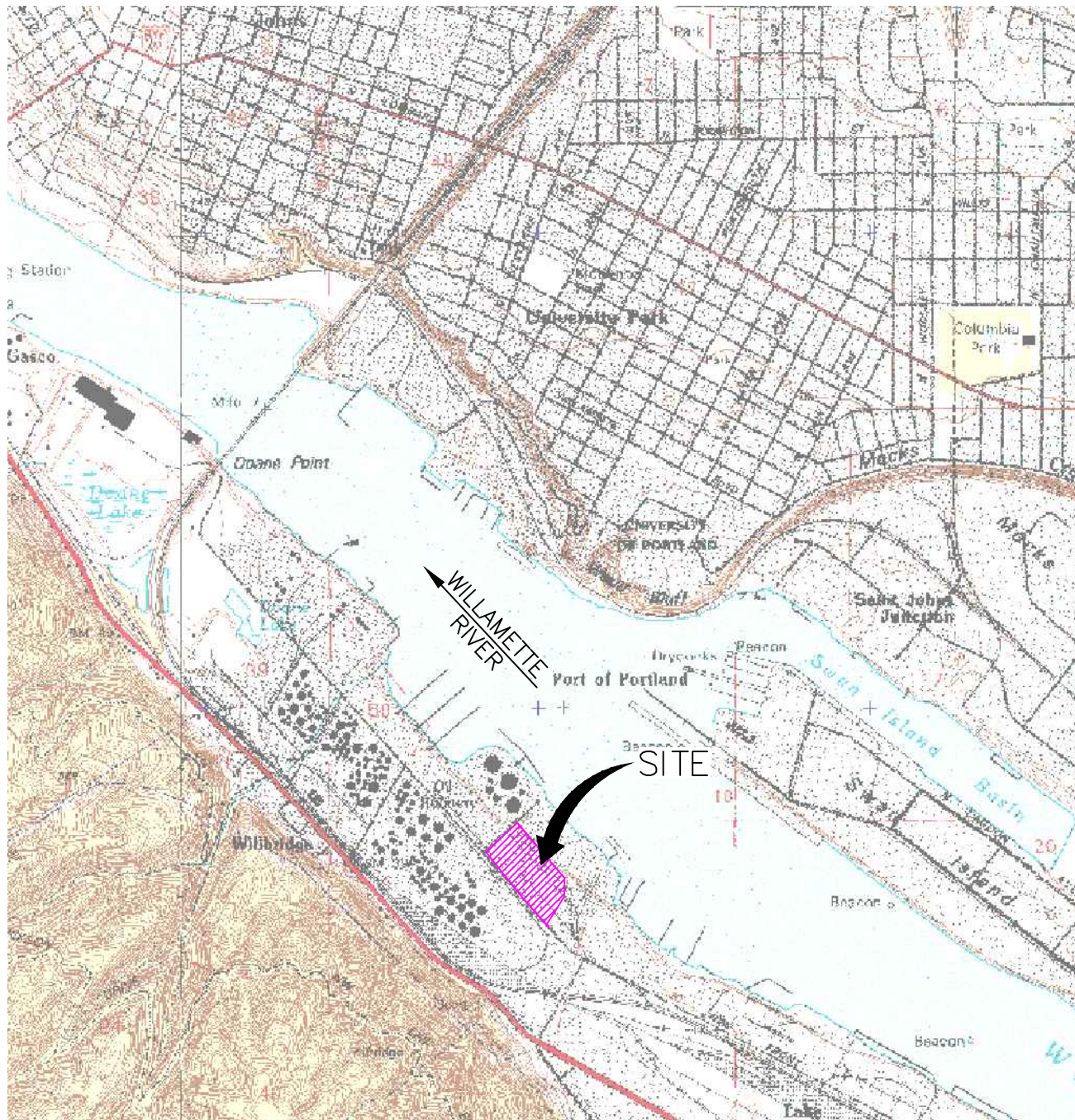
The following information is recorded and maintained at the site:

- Spills or leaks of significant materials that may have impacted stormwater runoff (i.e., fuels, hydraulic oils, steel shavings).
- Corrective actions.
- Surface water discharges (if applicable).
- Documentation of inspections and maintenance of stormwater control structures and treatment facilities.

The Preventive Maintenance Report (see Appendix C) is used whenever a stormwater control or treatment facility is inspected. The inspection point and its condition, the initial action (e.g., cleaning or repair), and the follow-up action (if needed) are recorded. The form is signed by the inspector and the reviewing supervisor.

Results of stormwater grab sampling and visual monitoring results are submitted by July 31 of each year to DEQ and the City using the DEQ-approved DMR (see Section 3.3.2). If insufficient rainfall makes sample collection impossible, these agencies are notified in writing.

# FIGURES



Base map prepared from DeLorme 3-D TopoQuads (1999).  
(T1N R1E, Sections 18 & 19, 45°33'34" & 122°44'0")

LEGEND:

 SITE

0 2000 4000  
  
SCALE IN FEET

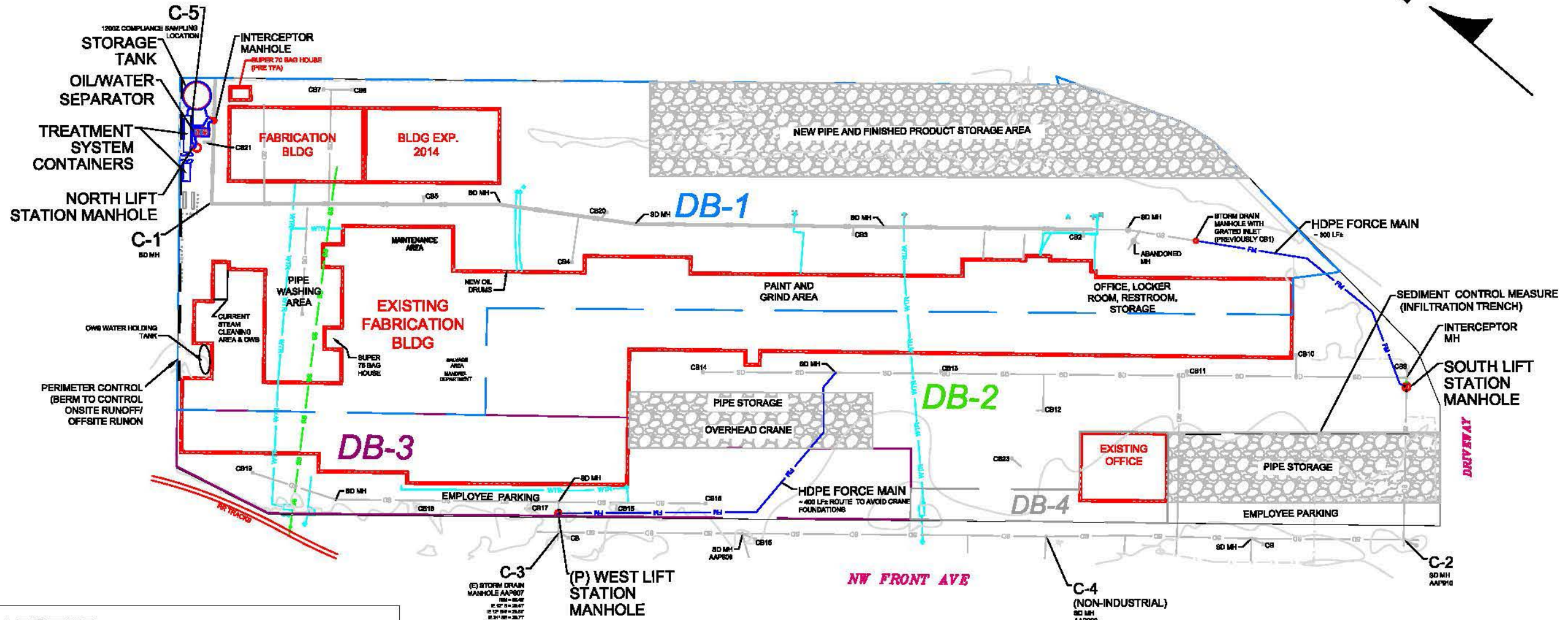


DATE 06/11/02  
DWN. AJY  
APPR. AHJ  
REVIS. LSC  
PROJECT NO.  
0025.01.01

**FIGURE 1**  
**TUBE FORGINGS OF AMERICA**  
**PORTLAND, OREGON**  
**SITE LOCATION MAP**

TUBE FORGINGS OF AMERICA, INC  
SWPCP - FIGURE 2  
FACILITY AND SITE DRAINAGE MAP

REVISIONS		Description
Rev	Date	



**LEGEND**

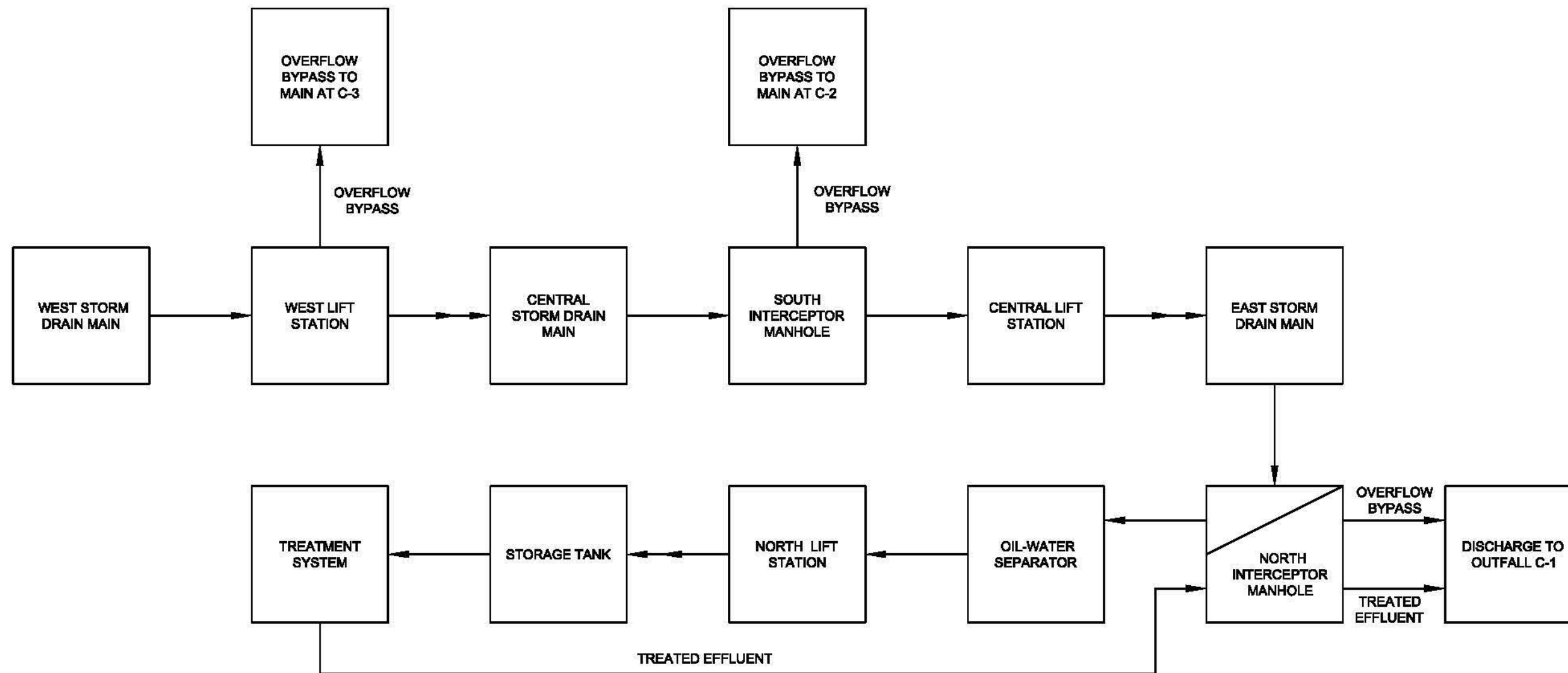
PROPERTY BOUNDARY  
DRAINAGE BASIN 1 (DB-1)  
DRAINAGE BASIN 2 (DB-2)  
DRAINAGE BASIN 3 (DB-3)  
DRAINAGE BASIN 4 (DB-4)  
BUILDING  
FENCE  
STORM DRAIN  
2014 STORM DRAIN  
SANITARY SYSTEM  
WATER  
CONTOUR  
GRAVEL  
CB = Catch Basin  
SD = Storm Drain  
MH = Manhole

**TOTAL PROPERTY AREA = 13.64 acres**  
Total Industrial Area = 13.26

**DRAINAGE BASIN AREAS (in acres)**  
DB-1 (C-1) = 7.48 acres  
DB-2 (C-2) = 4.06 acres  
DB-3 (C-3) = 1.72 acres  
DB-4\* (C-4) = 0.38 acres  
\*Non-Industrial

**DISCHARGE LOCATION**  
Willamette River  
WQ Flow DB-1 (C-1), existing connection remains for bypass  
WQ Flow to DB-1 (C-1), existing connection remains for bypass  
City MH AAP-906

**BYPASS CONNECTION**  
Willamette River  
City MH AAP-910  
City MH AAP-807  
No Change



TREATMENT SYSTEM SCHEMATIC 1  
2  
NTS

REVISIONS	
Rev	Description

# APPENDIX A

## NPDES TIER II STORMWATER TREATMENT PLAN



## DEQ Industrial Stormwater Permits

### Tier II Revised Stormwater Pollution Control Plan Checklist

*Instructions: Complete this form and submit with the revised SWPCP and engineered plan or waiver request. Fill in the requested information in the highlighted cells and the appropriate page number(s) indicating the location of information in the revised SWPCP.*

**Facility Name:** Tube Forgings

**File No.:** 104856

Permit Schedule	Requirement						Page #	Comments (for official use only)
A.12.c.ii	Date Revised Plan submitted:							
A.12	Outfall	Parameter	Geometric Mean Exceedance	Units	Percent Reduction in Concentration	Percent of Design Storm Infiltrated or Injected		
	C-1	Total Zn	.379	mg/L	76%	n/a		
	C-1	TSS	121	mg/L	75%	"		
	C-1	Total Cu	.027	mg/L	62%	"		
A.12.c.i.1	<b>Proposed Tier II Corrective Action Response</b>						App A - iv,2	
	0.83	Design storm in inches				App A - 2		
A.12.c.i.1	Rationale for the selection of the measures						App A - 2,7	
A.12.c.ii.	Schedule for implementing these measures						App A - 9	
A.12.c.i.2	Stamped by PE or CEG						App A - 1	
Cost of installation						App A - 8		
Treatment system schematic and operational plan						Figure 2&3		
Operation and maintenance schedule for treatment measures and/or volume reduction measures proposed						See SWPCP App B		

For DEQ or Agent use only			
A.12.c	Revised SWPCP complete and acceptable		
A.12.c.ii	Implementation of treatment measures by June 30th of 4th year of permit		
A.12.c.iii	Tier II Benchmark Exceedance Report submitted to DEQ or Agent		

**Notes:**

12/19/14

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# Tube Forgings of America, Inc

Portland, Oregon

## Tier II Stormwater Treatment Plan

*Prepared for:*

Tube Forgings of America, Inc.  
5200 NW Front Ave.  
Portland, OR 97210  
DEQ File Number - 104856

*Prepared by:*

Aquarius Environmental, LLC  
3204 NE 40<sup>th</sup> Avenue  
Portland, OR 97212  
503.427.8368  
[www.aquariusenv.com](http://www.aquariusenv.com)

# Tube Forgings of America, Inc

## Portland, Oregon

### Tier II Stormwater Treatment Plan

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**Table 4:** Projected Reduction of Pollutant Concentrations

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**Table 6:** Implementation Schedule

**Table 7:** Tier II Report Requirements Cross-Reference

## **Figures**

Copies of SWPCP Figures are attached for reference at the end of the report

**Figure 2:** Site Plan

**Figure 3:** Treatment Schematic

## **Appendices**

**Appendix A:** HydroCAD Modeling Output

## **Abbreviations**

AE	Aquarius Environmental
City	City of Portland
Cu	copper
DB	Drainage Basin
DEQ	Department of Environmental Quality
DMR	discharge monitoring report
gpm	gallons per minute
ID	inner-diameter
LF	linear feet
NPDES	National Pollutant Discharge Elimination System
OWS	oil/water separator
Permit File Number -	National Pollutant Discharge Elimination System 1200-Z Stormwater Permit (DEQ 104856
SBUH	Santa Barbara Urban Hydrograph
SCH 40 PVC	Schedule 40 polyvinyl chloride pipe
SDR-35 PVC	Standard dimension ratio polyvinyl chloride pipe
SIC	Standard Industrial Classification
sq ft	square feet
SWMR	Stormwater Management Report
TFA	Tube Forgings of America, Inc
TSS	total suspended solids
Zn	zinc

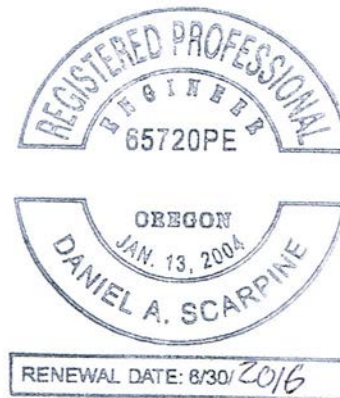
## Executive Summary

*Tube Forgings of America, Inc (TFA) is located at 5200 NW Front Avenue in Portland, Oregon on the west bank of the Willamette River. TFA is an industrial facility that manufactures precision welding fittings, which are the elbows and tees that are connecting points in pipelines, for oil refining, chemical and petro-chemical processing, gas transmission, power generation, shipbuilding, and a broad assortment of commercial construction applications (Standard Industrial Classification [SIC] Code 3498). TFA's total property area is 13.64 acres, of which 13.26 acres are industrial. The Oregon Department of Environmental Quality currently permits stormwater discharge from the TFA facility under a National Pollutant Discharge Elimination System 1200-Z Industrial Stormwater General Permit (the Permit). As per the Permit, TFA is required to perform Tier II Corrective Actions in response to geometric mean benchmark exceedances for total zinc, total copper, and total suspended solids (TSS) at multiple outfalls. In order to address oils, TSS, and heavy metals in site runoff, TFA submitted a building permit application including a Stormwater Management Report with proposed plans to capture and convey stormwater from all three industrial drainage basins to a proposed treatment train of oil/water separation and detention followed by active filtration and adsorption in November 2013. The system was installed summer 2014 and operational in November 2014. Based on vendor-supplied information and recent monitoring, the treatment system is capable of treating stormwater runoff in order to consistently meet the Permit benchmarks.*

## 1 Engineer's Certification

---

I hereby certify that this Tier II Stormwater Plan for Tube Forgings of America, Inc. has been prepared by me or under my supervision and meets minimum standards of the City of Portland, Oregon Department of Environmental Quality, and normal standards of engineering practice.



Aquarius Environmental, LLC  
Daniel A. Scarpine, P.E.  
Principal Engineer

## 2 Background

---

Tube Forgings of America, Inc. (TFA) is located at 5200 NW Front Avenue in Portland, Oregon, on the west bank of the Willamette River. TFA is an industrial facility that manufactures precision welding fittings, which are the elbows and tees that are connecting points in pipelines, for oil refining, chemical and petro-chemical processing, gas transmission, power generation, shipbuilding, and a broad assortment of commercial construction applications (Standard Industrial Classification [SIC] Code 3498). The total property's area is 13.64 acres, of which 13.26 acres is industrial (see Figure 2 Site Plan). The Oregon Department of Environmental Quality (DEQ) currently permits stormwater discharge from the TFA facility under a National Pollutant Discharge Elimination System (NPDES) 1200-Z Industrial Stormwater General Permit (the Permit). As per the Permit, TFA is required to perform Tier II Corrective Actions in response to geometric mean benchmark exceedances for total zinc (Total Zn), total copper (Total Cu), and total suspended solids (TSS) at multiple outfalls (see Section 3). In order to address oils, TSS, and heavy metals in site runoff, TFA submitted a Stormwater Management Report (SWMR) with proposed plans to capture and convey stormwater from all three industrial drainage basins to a proposed treatment train of oil/water separation and detention followed by Active filtration and adsorption in November 2013. The system was installed summer 2014 and operational in November 2014. Based on vendor-supplied information and recent monitoring, the treatment system is capable of treating stormwater runoff in order to consistently meet the Permit benchmarks.

## 3 Stormwater Characterization

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Table 1 compares the 2013-2014 Discharge Monitoring Report (DMR) geometric mean results at monitored outfalls from the three industrial drainage basins (DBs) (sample points C-1, C-2, & C-3) to the Permit benchmark levels. The geometric means exceeded the Permit benchmark concentrations for Total Zn, Total Cu, and TSS at various outfalls, thus, triggering required treatment measures.

**Table 1.** 2013-2014 DMR Results at TFA Industrial Outfalls Compared to 1200-Z Permit Benchmark Levels

Parameter units	pH SU	TSS mg/L	O&G mg/L	Total Cu mg/L	Total Pb mg/L	Total Zn mg/L
<i>Benchmark</i>	5.5-9.0	100	10	0.020	0.040	0.12
<b>DB-1: C-1 Outfall</b>						
SE1	7.4	39	ND (4.81)	0.011	0.004	<b>0.241</b>
SE2	7.6	<b>720</b>	ND (4.76)	<b>0.134</b>	<b>0.050</b>	<b>1.500</b>
SE3	8.0	<b>122</b>	ND (4.76)	<b>0.024</b>	0.010	<b>0.233</b>
SE4	7.1	62	ND (4.81)	0.016	0.006	<b>0.245</b>
<i>Geometric Mean</i>		<b>121</b>	2	<b>0.027</b>	<b>0.010</b>	<b>0.379</b>
<b>DB-2: C-2 Outfall</b>						
SE1	7.4	24	ND (4.90)	0.005	0.003	0.112
SE2	7.5	<b>132</b>	ND (4.72)	<b>0.029</b>	0.019	<b>0.503</b>
SE3	7.7	74	ND (4.76)	0.008	0.006	0.095
SE4	7.2	28	ND (4.81)	0.008	0.005	0.114
<i>Geometric Mean</i>		<b>51</b>	2	<b>0.010</b>	<b>0.007</b>	<b>0.157</b>
<b>DB-3: C-3 Outfall</b>						
SE1	7.3	20	ND (4.85)	0.007	0.003	<b>0.132</b>
SE2	7.4	<b>110</b>	5	<b>0.035</b>	0.018	<b>0.336</b>
SE3	7.6	54	ND (4.85)	0.014	0.007	<b>0.198</b>
SE4	7.0	22	ND (4.81)	0.008	0.003	0.115
<i>Geometric Mean</i>		<b>40</b>	3	<b>0.013</b>	<b>0.006</b>	<b>0.178</b>

Results in **bold** exceed benchmarks values.

SE = Sample Event

## 4 Existing Drainage Basin Characteristics

The TFA site is zoned heavy industrial (IH<sub>i</sub>)<sup>1</sup> and primarily consists of building rooftops surrounded by impervious asphalt pavement, with the exception of a small area of pervious ground cover where pipe, scrap metal, and finished product are stored. The topography and building locations divide the property into four hydrologic drainage basins (DBs) that make up the existing stormwater collection and conveyance system. DB-1 covers the north and east portions of the property, approximately half of the total area, and discharges to the Willamette River in the north corner of the site (sample point C-1). DB-2 and DB-3 cover the south and west portions of the site, respectively, and discharge to the City of Portland (City) combined sewer via two outfalls at NW Front Avenue (sample points C-2 & C-3, respective to DB-2 & DB-3). DB-4 also discharges to the City combined sewer (C-4). DB-4 is non-industrial and will not be further discussed in this Tier II plan. The proposed improvements, installed in the summer of 2014 and operational in November 2014, will capture and redirect stormwater runoff from DB-2 and DB-3 to the catchment and conveyance system currently serving

<sup>1</sup> Portlandmaps Zoning Overlay, as viewed at [www.portlandmaps.com](http://www.portlandmaps.com)

DB-1 to ultimately be treated and released in to the Willamette River in the north corner of the site. See Table 2 for DB summary. See Figure 2 for Site Plan.

**Table 2.** Drainage Basin Summary

Basin units	Cover	CN	Area acres	Total Area acres	Existing Routing	Proposed Routing
DB-1	Impervious	98	6.13	7.48	Willamette River	To Treatment Train
	Pervious	80	1.35			
DB-2	Impervious	98	3.04	4.06	City combined sewer	South Lift Station FM to Catchment 1 to Treatment
	Pervious	80	1.02			
DB-3	Impervious	98	1.72	1.72	City combined sewer	West Lift Station FM to Catchment 2 and South Lift Station to Treatment
DB-4*	Impervious	98	0.38	0.38	City combined sewer	Non-industrial, continue existing routing
<b>Total Property</b>				<b>13.64</b>		
<b>Total To Treatment</b>				<b>13.26</b>		

\*Non-industrial and not routed to proposed treatment.

## 5 Design Hydrology

Aquarius Environmental (AE) conducted hydrologic drainage basin analysis calculations for proposed treatment system sizing included in the SWMR submitted in November 2013. Lift stations, diversion manholes, weirs, force mains, gravity pipes, and components of the treatment system were sized based on the water quality flow rate (Qwq) established by the Santa Barbara Urban Hydrograph (SBUH). Table 3 below shows the water quality flow rates of each drainage basin and the combined flow rate for proposed treatment. The drainage basins were analyzed using HydroCAD 10 modeling software employing the SBUH. Design storms of 24-hour duration and 6-month, 2-year, 10-year, 25-year and 100-year return periods were selected and runoff calculations were performed as outlined in Table C.1 of Appendix C.1 of the *City of Portland 2014 Stormwater Management Manual*.

Per the 2014 City Stormwater Management Manual (SWMM), the minimum design storm for water quality is 0.83 inch / 24-hour event. This results in an approximately 90% net annual capture of runoff. In September 2014, DEQ issued Tier II design storm guidance requiring designers to use the most restrictive of either the local jurisdiction standard or 50% of a 2-year 24-hour event. Since the TFA project was designed and permitted for construction in late 2013 and the project was approved by the City, almost one year prior to the DEQ guidance, it is clear that TFA's system design conditions meet the DEQ requirement for a design storm that is "necessary and adequate."

Standard modeling assumptions are as follows:

<u>SCS Curve Number:</u>	98 for all impervious surfaces, 80 for all pervious surfaces
<u>Design Storm Event:</u>	0.83" / 24-hour
<u>Available proposed tank storage:</u>	85,000 gal

The contributing drainage areas are summarized in Table 2 and the combined, industrial, DB hydrologic flow is summarized in Table 3 below.

**Table 3.** Water Quality Flow (Qwq) for the Minimum 6-Month 24-Hour Return Period along with 2-Year, 10-Year, 25-Year, and 100-Year Return Periods for an Assumed Uncontrolled Combined Flow of DB1, DB2, & DB3

<b>Qwq</b> cfs (gpm)	<b>Q2</b> cfs (gpm)	<b>Q10</b> cfs (gpm)	<b>Q25</b> cfs (gpm)	<b>Q100</b> cfs (gpm)
1.57 (705)	5.64 (2531)	8.41 (3774)	9.79 (4394)	10.99 (4932)

## 6 Proposed Stormwater Treatment Measures

As noted above, proposed stormwater treatment measures were designed and permitted in November 2013 and constructed during summer 2014. Based on the 24-hour duration, 6-month return period design storm for this site (see HydroCAD modeling output in Appendix A), the improvements re-route runoff from DB-3 (via West Lift Station) and DB-2 (via South Lift Station) to the conveyance system serving DB-1. In DB-3, flow is intercepted by a lift station manhole equipped with an overflow standpipe and submersible pump. The pump forwards flows to an existing manhole connected to the DB-2 drainage system. The lift station and existing manhole are connected via a 4 inch Schedule 40 polyvinyl chloride (4" SCH-40 PVC) force main. In DB-2, flow is intercepted by a lift station manhole equipped with an overflow standpipe and submersible pump. The pump forwards flows to an installed manhole (which replaced an existing catch basin) by means of a 4" SCH-40 PVC force main. Modifications to the DB-1 conveyance system route flow from all three catchments to the installed treatment system, and returned to the existing storm drain post-treatment for discharge in to the Willamette River. These modifications include an interceptor flow-splitting manhole to route flow to an installed oil/water separator (OWS) followed by an installed lift station manhole (North Lift Station) and force main to pump runoff to the surge tank and treatment system. See Figure 2 for a Site Plan and Figure 3 for a Treatment Schematic. Details of improvements are specified in the sub-sections below.

### 6.1 West Lift Station

In order to divert DB-3 runoff, a proposed 6' inner-diameter (ID) lift station manhole with a submersible pump is located upstream of the City combined sewer outfall on the existing 12 inch drainage line. A 4" SCH-40 PVC force main pumps water 372 feet to an existing, southeast-bound, storm drain serving DB-2. The existing 18 inch drainage line directs water to the proposed South

Lift Station. Runoff from DB-3 ultimately reaches the DB-1 conveyance system headed for treatment in the north corner of the site.

## 6.2 South Lift Station

To divert DB-2 runoff, a 8' ID lift station manhole is located upstream of the City combined sewer outfall and downstream of the existing 18 inch drainage line carrying both DB-2 runoff and water pumped in from DB-3. A 4" SCH- 40 PVC force main pumps water 304 feet north to a proposed 4' ID manhole (about 3.5 feet from the rim to sump) in DB-1. The existing DB-1 conveyance system (gravity) then conveys flow from the interceptor manhole in the north corner of the site to the treatment train.

## 6.3 North Lift Station

The combined drainage from DB-1, DB-2, and DB-3 follows the existing 24 inch DB-1 drainage line to a 5' ID interceptor manhole with a weir-equipped, flow-splitter in the north corner of the site. A 10 inch SDR-35 PVC pipe diverts flow to an adjacent coalescing-plate OWS.

## 6.4 Treatment Train

### 6.4.1 Oil/Water Separator (OWS)

The OWS is a precast concrete vault that utilizes a sediment weir followed by coalescing media to separate high- and low-density oils that are collected against an oil-retaining baffle. A submerged gap in the baffle allows for the treated water to pass through and into a 12" SDR-35 PVC discharge pipe. The OWS can be accessed via surface vault doors.

### 6.4.2 Wetwell

The 12" SDR-35 PVC pipe flows out of the OWS into a wet well which is an 8' ID lift station manhole equipped with a multiple-switch-control submersible pump able to accommodate the combined 6-month, 24-hour event flow of DBs 1-3. Water is then pumped to an 85,000-gallon surge tank 20 linear feet (LF) away (59 feet pipe length) through a 6" SCH-40 PVC force main.

### 6.4.3 Surge Tank

The 85,000-gallon surge tank provides aboveground storage for the remaining treatment process plus time for suspended solids to settle and accumulate. The surge tank is equipped with a 6" diameter, overflow pipe on the top of the tank that discharges to the ground and is captured and directed back to the existing pre-treatment DB-1 drainage line. A 6" SCH- 40 PVC line connects the surge tank with the treatment system 10 LF away.

### 6.4.4 Treatment System

The treatment system consists of two-stage active disc filtration, cartridge filtration, and two-stage metal-adsorbing media filtration. The disc filters are equipped to perform regular backwash cycles to remove trapped particles and maintain filter performance. The backwashed solids are conveyed to a decanting tank, where they are allowed to settle out of suspension for removal and disposal at a permitted, off-site location. Backwash decant from the filtration system is conveyed via a 6 inch gravity pipe to the splitter manhole just upstream of the OWS for reprocessing.

Two-stage metal removal media reacts with stormwater constituents to remove metal contaminants from stormwater. The media contains a finite number of pollutant receptors, and its treatment ability eventually will become exhausted. The unit requires replacement of this media to continue to be effective, and the rate at which it must be replaced depends on the flow rate being treated, as well as the concentration of pollutants in that flow. Clarus, LLC will supply filtration and metals polishing treatment media and equipment for TFA to remain compliant under the Permit.

Treated effluent runs into a 6" SCH-40 PVC gravity line that runs back to the weir-controlled flow-splitter. The outlet is on the downstream side of the weir where the water is able to flow into the existing 24 inch discharge line to the Willamette River.

## 7 Expected Treatment Performance

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Recent effluent data indicate that the proposed treatment measure described in Section 6 significantly reduced TSS and heavy metals, among other pollutant parameters, at the TFA facility. It is likely that the proposed treatment train, along with routine operations & maintenance (O&M), will and have resulted in meeting Permit benchmark. The sub-sections below describe the projected reduction of pollutant concentrations for those parameters exceeding the benchmarks at TFA.

### 7.1 Projected Reduction of Pollutant Concentration

In Table 4 below, the projected reduced pollutant concentrations are compared to geometric means reported in the 2013-2014 DMR for exceeding parameters resulting in a Projected Reduction Percentage. Since the proposed design combines the three existing industrial outfalls, the predicted treatment influent concentrations are assumed to be the peak observed geometric mean concentration from the outfalls. Based on a review of available data provided by TFA<sup>2</sup> and Clarus Water Treatment Solutions<sup>3</sup>, the treatment system will likely continue to reduce effluent discharge concentration below benchmarks. To add conservatism to predicted performance and account for potential variation in operation, AE used a factor of safety of 2.0 times the observed effluent results to predict future effluent concentrations.

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<sup>2</sup> Apex Laboratory report #A4K0596 dated November 26, 2014

<sup>3</sup> Email to Aquarius Environmental dated November 18, 2014

**Table 4.** Projected Reduction of Pollutant Concentrations for Exceeding Parameters at TFA

	<b>TSS mg/L</b>	<b>Total Cu mg/L</b>	<b>Total Zn mg/L</b>
<b>C-1 Pre-treatment Concentration (Geometric Mean)</b>	121	0.027	0.379
<b>C-2 Pre-treatment Concentration (Geometric Mean)</b>	n/a	n/a	0.157
<b>C-3 Pre-treatment Concentration (Geometric Mean)</b>	n/a	n/a	0.178
<b>Combined Treatment Influent (Peak Geomean)</b>	121	0.027	0.714
<b>Predicted Effluent Concentration</b>	30	0.010	0.088
<b>Projected Reduction (%)</b>	75%	62%	76%

## 8 Costs of Tier II Measures

Table 5 below summarizes costs of the Tier II treatment measures.

**Table 5.** Costs Associated with the Implementation of Tier II Measures

<b>Parameter</b>	<b>Infrastructure Improvements</b>
<b>Treatment System Equipment, Detention Tank, Engineering &amp; Design, Permits and Construction</b>	<b>\$1,520,844</b>

## 9 Operation & Maintenance (O&M)

Routine maintenance will be required to ensure a properly functioning of the proposed treatment train. A copy of the Operation & Maintenance Manual (O&M) containing procedures for treatment measures will be kept on-site as part of the stormwater pollution control plan (SWPCP) and made available upon DEQ or City Bureau of Environmental Services (BES) request. See Appendix B of the SWPCP for O&M Manual.

## 10 Implementation Schedule

The implementation schedule for Tier II measures is summarized in Table 6.

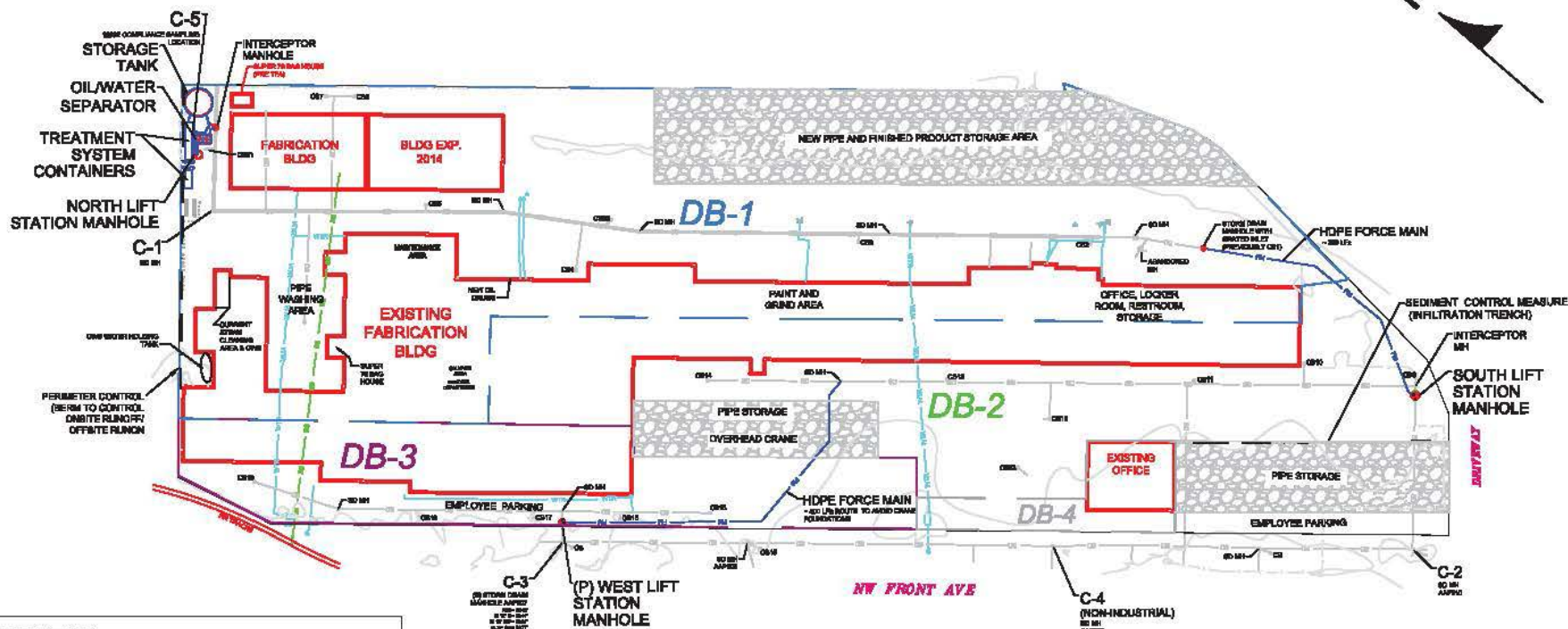
**Table 6.** Implementation Schedule for Tier II Measures

Task	Target Completion Date
Prepare and Submit Tier II Report	December 30, 2014
Treatment Installation	Summer 2014
Equipment Start-up and Online	November 2014
Evaluate treatment measures requirements for additional Tier II response (if necessary)	Fall-Winter 2016

## 11 Tier II Report Requirements Cross-Reference

**Table 7.** Tier II Report Requirements Cross-Reference Checklist.

Permit Schedule	Tier II Report Requirement	Section #
A.12.c.ii	Date revised Plan submitted	Cover Page
A.12	Outfalls, exceedances, % reduction concentration, & design storm infiltrated	3, 4, & 7
A.12.c.i.1	Design storm in inches	5
A.12.c.i.1	Rationale for the selection of the measures	6
A.12.c.ii	Schedule for implementing these measure	10
A.12.c.i.2	Stamped by PE or CEG	1
Additional Requirements	Cost of installation	8
Additional Requirements	Treatment system schematic and operational plan	Figure 3
Additional Requirements	Operation and maintenance schedule for treatment measures and/or volume reduction	Appendix B



**LEGEND**

PROPERTY BOUNDARY  
 DRAINAGE BASIN 1 (DB-1)  
 DRAINAGE BASIN 2 (DB-2)  
 DRAINAGE BASIN 3 (DB-3)  
 DRAINAGE BASIN 4 (DB-4)  
 BUILDING  
 FENCE  
 STORM DRAIN  
 2014 STORM DRAIN  
 SANITARY SYSTEM  
 WATER  
 CONTOUR  
 GRAVEL  
 C-1 = Catch Basin  
 SD = Storm Drain  
 MH = Manhole

NOTES:  
 1. THIS PLAN IS A PRELIMINARY DESIGN. IT IS NOT TO BE USED FOR CONSTRUCTION OR FOR ANY OTHER PURPOSE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.  
 2. THE ENGINEER HAS NOT CONDUCTED A VISUAL INSPECTION OF THE SITE. THE USER SHALL BE RESPONSIBLE FOR VERIFYING THE ACCURACY OF THE INFORMATION PROVIDED ON THIS PLAN.  
 3. THE ENGINEER HAS NOT CONDUCTED A VISUAL INSPECTION OF THE SITE. THE USER SHALL BE RESPONSIBLE FOR VERIFYING THE ACCURACY OF THE INFORMATION PROVIDED ON THIS PLAN.

**TOTAL PROPERTY AREA = 13.64 acres**  
**Total Industrial Area = 13.26**

**DRAINAGE BASIN AREAS (in acres)**  
 DB-1 (C-1) = 7.48 acres  
 DB-2 (C-2) = 4.06 acres  
 DB-3 (C-3) = 1.72 acres  
 DB-4\* (C-4) = 0.38 acres  
 \*Non-Industrial

**DISCHARGE LOCATION**  
 Willamette River  
 WQ Flow DB-1 (C-1), existing connection remains for bypass  
 WQ Flow to DB-1 (C-1), existing connection remains for bypass  
 City MH AAP-806

**BYPASS CONNECTION**  
 Willamette River  
 City MH AAP-810  
 City MH AAP-807  
 No Change

**SITE PLAN** 1/1  
 SCALE: 1" = 50'

**Aquarius Environmental**  
 www.aquariusem.com

**TUBE FORGINGS OF AMERICA, INC**  
**SWPCP - FIGURE 2**  
**FACILITY AND SITE DRAINAGE MAP**

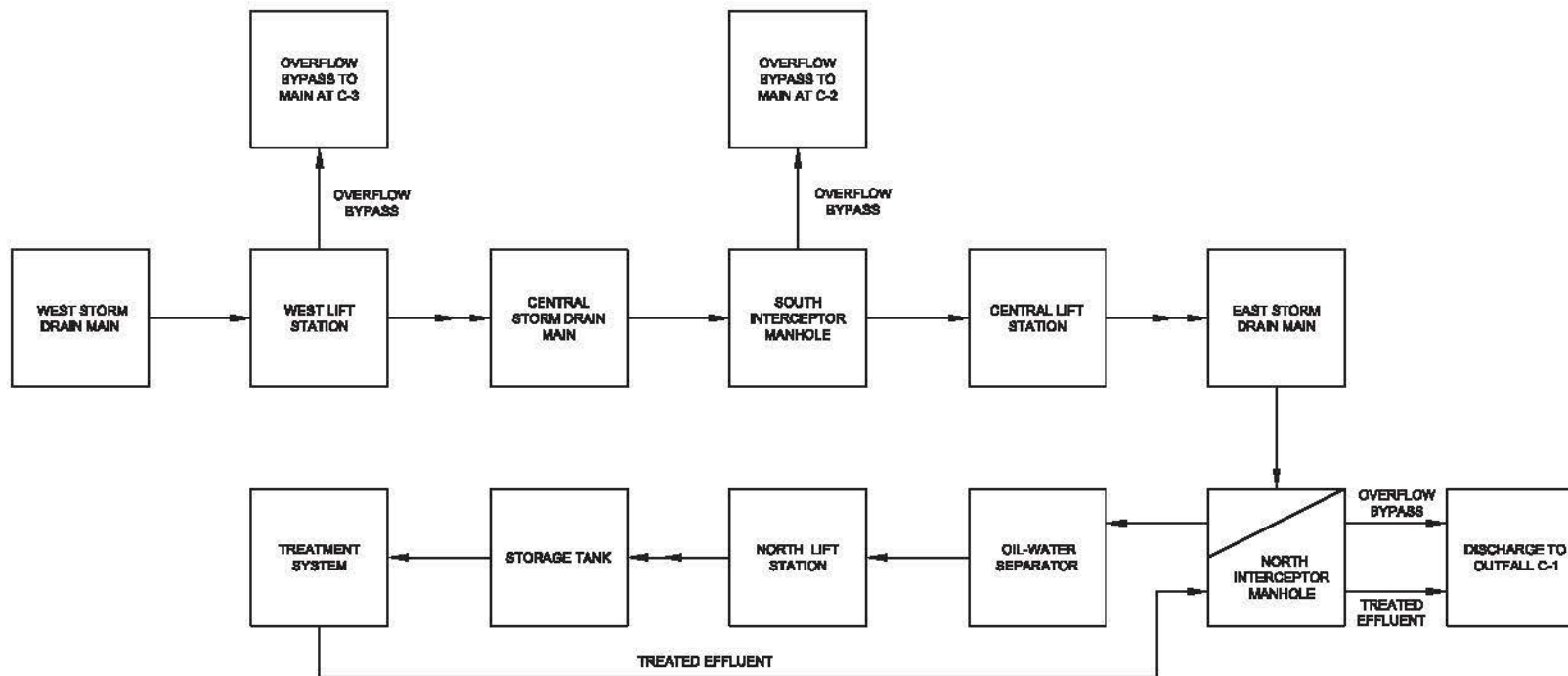
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REVISIONS

No.	Date	Description

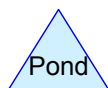
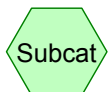
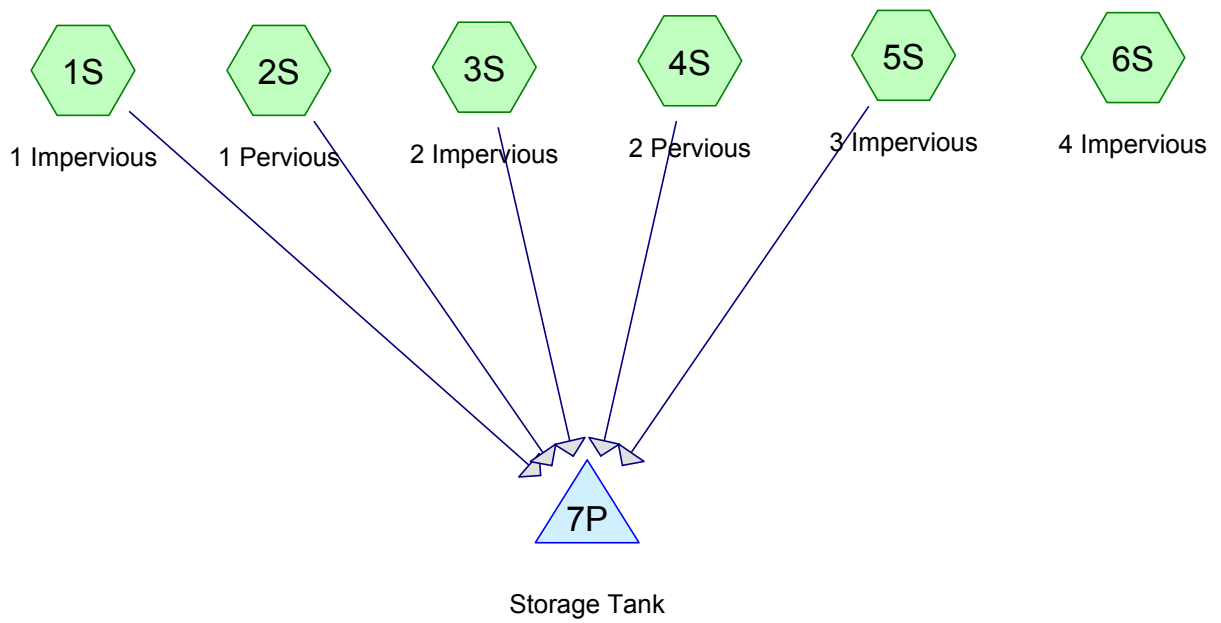
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TREATMENT SYSTEM SCHEMATIC 1  
2

## **Appendix A:** Hydrologic Modeling Output



#### Routing Diagram for TF

Prepared by Aquarius Environmental LLC, Printed 7/8/2013  
HydroCAD® 10.00 s/n M32594 © 2012 HydroCAD Software Solutions LLC

**TF**

Prepared by Aquarius Environmental LLC

Printed 7/8/2013

HydroCAD® 10.00 s/n M32594 © 2012 HydroCAD Software Solutions LLC

Page 2

**Area Listing (all nodes)**

Area (acres)	CN	Description (subcatchment-numbers)
11.270	98	(1S, 3S, 5S, 6S)
2.370	80	(2S, 4S)
<b>13.640</b>	<b>95</b>	<b>TOTAL AREA</b>

TF

Type IA 24-hr 1 City WQ Storm 0.83/24 Rainfall=0.83"

Prepared by Aquarius Environmental LLC

Printed 7/8/2013

HydroCAD® 10.00 s/n M32594 © 2012 HydroCAD Software Solutions LLC

Page 3

### Summary for Pond 7P: Storage Tank

Inflow Area = 13.260 ac, 82.13% Impervious, Inflow Depth > 0.52" for 1 City WQ Storm 0.83/24 event  
 Inflow = 1.56 cfs @ 8.00 hrs, Volume= 0.573 af  
 Outflow = 0.27 cfs @ 6.50 hrs, Volume= 0.434 af, Atten= 82%, Lag= 0.0 min  
 Primary = 0.27 cfs @ 6.50 hrs, Volume= 0.434 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 110.51' @ 16.13 hrs Surf.Area= 0.016 ac Storage= 0.171 af

Plug-Flow detention time= 278.6 min calculated for 0.434 af (76% of inflow)  
 Center-of-Mass det. time= 129.5 min ( 864.9 - 735.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	0.261 af	<b>30.00'D x 16.08'H Vertical Cone/Cylinder</b>

Device	Routing	Invert	Outlet Devices
#1	Secondary	116.00'	<b>999.0" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	100.00'	<b>Pump</b> Discharges@0.00' Flow (gpm)= 0.0 120.0 121.0 122.0 123.0 Head (feet)= 20.00 18.00 16.00 5.00 0.50

**Primary OutFlow** Max=0.27 cfs @ 6.50 hrs HW=100.99' (Free Discharge)  
 ↑**2=Pump** (Pump Controls 0.27 cfs)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=100.00' (Free Discharge)  
 ↑**1=Orifice/Grate** ( Controls 0.00 cfs)

### Summary for Pond 7P: Storage Tank

[93] Warning: Storage range exceeded by 0.14'

[88] Warning: Qout>Qin may require Finer Routing>1

[85] Warning: Oscillations may require Finer Routing>1

Inflow Area = 13.260 ac, 82.13% Impervious, Inflow Depth > 1.92" for 2year 2.4/24 event  
 Inflow = 5.64 cfs @ 8.00 hrs, Volume= 2.121 af  
 Outflow = 5.96 cfs @ 7.95 hrs, Volume= 1.860 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.27 cfs @ 2.55 hrs, Volume= 0.500 af  
 Secondary = 5.68 cfs @ 7.95 hrs, Volume= 1.359 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 116.22' @ 7.95 hrs Surf.Area= 0.016 ac Storage= 0.261 af

Plug-Flow detention time= 137.6 min calculated for 1.856 af (88% of inflow)  
 Center-of-Mass det. time= 53.6 min ( 748.4 - 694.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	0.261 af	<b>30.00'D x 16.08'H Vertical Cone/Cylinder</b>

Device	Routing	Invert	Outlet Devices
#1	Secondary	116.00'	<b>999.0" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	100.00'	<b>Pump</b>
			Discharges@0.00'
			Flow (gpm)= 0.0 120.0 121.0 122.0 123.0
			Head (feet)= 20.00 18.00 16.00 5.00 0.50

**Primary OutFlow** Max=0.27 cfs @ 2.55 hrs HW=101.02' (Free Discharge)

↑**2=Pump** (Pump Controls 0.27 cfs)

**Secondary OutFlow** Max=1.96 cfs @ 7.95 hrs HW=116.22' (Free Discharge)

↑**1=Orifice/Grate** (Orifice Controls 1.96 cfs @ 1.59 fps)

### Summary for Pond 7P: Storage Tank

[93] Warning: Storage range exceeded by 0.22'

[88] Warning: Qout>Qin may require Finer Routing>1

[85] Warning: Oscillations may require Finer Routing>1

Inflow Area = 13.260 ac, 82.13% Impervious, Inflow Depth > 2.86" for 10year 3.4/24 event  
 Inflow = 8.40 cfs @ 8.00 hrs, Volume= 3.164 af  
 Outflow = 9.16 cfs @ 8.00 hrs, Volume= 2.904 af, Atten= 0%, Lag= 0.1 min  
 Primary = 0.27 cfs @ 1.90 hrs, Volume= 0.511 af  
 Secondary = 8.89 cfs @ 8.00 hrs, Volume= 2.393 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 116.30' @ 8.00 hrs Surf.Area= 0.016 ac Storage= 0.261 af

Plug-Flow detention time= 98.8 min calculated for 2.898 af (92% of inflow)  
 Center-of-Mass det. time= 40.5 min ( 725.7 - 685.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	0.261 af	<b>30.00'D x 16.08'H Vertical Cone/Cylinder</b>

Device	Routing	Invert	Outlet Devices
#1	Secondary	116.00'	<b>999.0" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	100.00'	<b>Pump</b> Discharges@0.00' Flow (gpm)= 0.0 120.0 121.0 122.0 123.0 Head (feet)= 20.00 18.00 16.00 5.00 0.50

**Primary OutFlow** Max=0.27 cfs @ 1.90 hrs HW=101.05' (Free Discharge)

↑**2=Pump** (Pump Controls 0.27 cfs)

**Secondary OutFlow** Max=3.70 cfs @ 8.00 hrs HW=116.30' (Free Discharge)

↑**1=Orifice/Grate** (Orifice Controls 3.70 cfs @ 1.86 fps)

### Summary for Pond 7P: Storage Tank

[93] Warning: Storage range exceeded by 0.24'

[88] Warning: Qout>Qin may require Finer Routing>1

[85] Warning: Oscillations may require Finer Routing>1

Inflow Area = 13.260 ac, 82.13% Impervious, Inflow Depth > 3.34" for 25year 3.9/24 event  
 Inflow = 9.79 cfs @ 8.00 hrs, Volume= 3.693 af  
 Outflow = 9.90 cfs @ 7.95 hrs, Volume= 3.432 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.27 cfs @ 1.70 hrs, Volume= 0.514 af  
 Secondary = 9.63 cfs @ 7.95 hrs, Volume= 2.918 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 116.32' @ 7.95 hrs Surf.Area= 0.016 ac Storage= 0.261 af

Plug-Flow detention time= 86.7 min calculated for 3.432 af (93% of inflow)  
 Center-of-Mass det. time= 35.8 min ( 717.5 - 681.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	0.261 af	<b>30.00'D x 16.08'H Vertical Cone/Cylinder</b>

Device	Routing	Invert	Outlet Devices
#1	Secondary	116.00'	<b>999.0" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	100.00'	<b>Pump</b>
			Discharges@0.00'
			Flow (gpm)= 0.0 120.0 121.0 122.0 123.0
			Head (feet)= 20.00 18.00 16.00 5.00 0.50

**Primary OutFlow** Max=0.27 cfs @ 1.70 hrs HW=101.04' (Free Discharge)

↑**2=Pump** (Pump Controls 0.27 cfs)

**Secondary OutFlow** Max=4.19 cfs @ 7.95 hrs HW=116.32' (Free Discharge)

↑**1=Orifice/Grate** (Orifice Controls 4.19 cfs @ 1.92 fps)

**Summary for Pond 7P: Storage Tank**

[93] Warning: Storage range exceeded by 0.30'

[88] Warning: Qout&gt;Qin may require Finer Routing&gt;1

[85] Warning: Oscillations may require Finer Routing&gt;1

Inflow Area = 13.260 ac, 82.13% Impervious, Inflow Depth > 3.82" for 100 year 4.4/24 event  
 Inflow = 11.20 cfs @ 8.00 hrs, Volume= 4.226 af  
 Outflow = 12.19 cfs @ 8.00 hrs, Volume= 3.966 af, Atten= 0%, Lag= 0.1 min  
 Primary = 0.27 cfs @ 1.55 hrs, Volume= 0.516 af  
 Secondary = 11.91 cfs @ 8.00 hrs, Volume= 3.450 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 116.38' @ 8.00 hrs Surf.Area= 0.016 ac Storage= 0.261 af

Plug-Flow detention time= 76.9 min calculated for 3.958 af (94% of inflow)  
 Center-of-Mass det. time= 32.5 min ( 711.3 - 678.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	0.261 af	<b>30.00'D x 16.08'H Vertical Cone/Cylinder</b>

Device	Routing	Invert	Outlet Devices
#1	Secondary	116.00'	<b>999.0" Vert. Orifice/Grate</b> C= 0.600
#2	Primary	100.00'	<b>Pump</b> Discharges@0.00' Flow (gpm)= 0.0 120.0 121.0 122.0 123.0 Head (feet)= 20.00 18.00 16.00 5.00 0.50

**Primary OutFlow** Max=0.27 cfs @ 1.55 hrs HW=101.03' (Free Discharge)  
 ↑**2=Pump** (Pump Controls 0.27 cfs)

**Secondary OutFlow** Max=5.85 cfs @ 8.00 hrs HW=116.38' (Free Discharge)  
 ↑**1=Orifice/Grate** (Orifice Controls 5.85 cfs @ 2.09 fps)

# APPENDIX B

## STORMWATER TREATMENT SYSTEM OPERATIONS AND MAINTENANCE PLAN

11/20/2013

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# Appendix B: Stormwater Operations & Maintenance Plan

As Required by  
2008 City of Portland Stormwater Management Manual

*Prepared for:*

Tube Forgings of America, Inc.  
5200 NW Front Ave.  
Portland, OR 97210

DEQ File Number - 104856

*Prepared by:*

Engineer:  
Aquarius Environmental, LLC  
3204 NE 40<sup>th</sup> Avenue  
Portland, OR 97212  
503.427.8368  
[www.aquariusenv.com](http://www.aquariusenv.com)

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## 1 Responsibility

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The stormwater drainage and treatment system at Tube Forgings of America, Inc. (TFA) is wholly operated by TFA and jointly maintained by TFA. The responsible individual for TFA is Kim Rowley, 5200 NW Front Ave, Portland, OR 97210.

## 2 Stormwater Facility Description

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### 2.1 Site Description

TFA is an industrial facility that manufactures welding fittings for oil refining, chemical and petro-chemical processing, gas transmission, power generation, and a broad assortment of commercial construction applications (SIC Code 3498). The site primarily consists of impervious asphalt concrete pavement and building roofs, with the exception of a small area of pervious ground cover where pipe, scrap metal, and finished product are stored. The property topography, building locations, and roof layout create four main hydrologic basins. Runoff from these basins is currently managed with an existing stormwater collection system. In the proposed improvements, the existing stormwater drainage system will be modified to combine three separate stormwater collection sub-systems (Catchments 1-3) into a single discharge layout where the stormwater will be intercepted and treated. A small office and parking area is located on the property, but contributes no industrial runoff (Catchment 4).

### 2.2 Stormwater Management Facility Locations

The site generates runoff from four catchment basins (three of which are considered for this plan), established by building locations and local topography. Catchments 1, 2, and 3 are considered industrial, while Catchment 4 is non-industrial and is routed to the existing combined sewer. Table 1 below gives a summary of the drainage basins on site.

**Table 1.** A summary of drainage basins on the TFA site.

<b>Catchment</b>	<b>Description</b>	<b>Approximate Area (acres)</b>	<b>Public / Private</b>	<b>Routed Facility Type</b>
1	North and East portions of site, primarily building roof and impervious asphalt, approximately half of the total site area	7.48	Private	Weir-equipped interceptor MH to OWS to North Lift Station to Treatment
2	South portion of site, primarily building roofs and impervious asphalt	4.06	Private	South Lift Station MH to FM to Catchment 1 conveyance system
3	West portion of site, primarily building roofs and impervious asphalt	1.72	Private	West Lift Station MH to FM to Catchment 2 conveyance system
4	Non-industrial employee parking lot	Non-industrial	Private	Not discussed in this plan

Runoff from all basins travels as sheet flow to catch basins connected to underground gravity flow collection and conveyance systems. Runoff from Catchment 3 is routed through the West Lift Station and pumped to the drainage system that currently serves Catchment 2. Runoff from Catchment 2 plus water pumped in from the West Lift Station is conveyed via gravity flow drainage system to the South Lift Station. The South Lift Station is pumped to a manhole in the Catchment 1 drainage system. The combined runoff from the three basins is diverted with a flow splitter manhole that will allow stormwater to pass through the treatment train then discharged to the Willamette River post-treatment.

The Stormwater Treatment Train is designed to provide the site compliance under the Oregon 1200-Z Industrial Stormwater General Permit. The following effluent benchmarks are used for design criteria:

- Total Copper: **0.02 mg/L**
- Total Lead: **0.04 mg/L**
- Total Zinc: **0.12 mg/L**
- Total Iron: **1.0 mg/L**
- Total Aluminum: **0.75 mg/L**
- pH: **5.5-9.0 SU**
- TSS: **100 mg/L**
- Total Oil & Grease: **10 mg/L**

To achieve proposed benchmarks, a treatment train is proposed. The treatment train components and locations are indicated in Table 2.

**Table 2.** Treatment train components and locations on the TFA site.

<b>Facility ID</b>	<b>Description</b>	<b>Location</b>	<b>Stormwater Source</b>
Oil Water Separator (OWS)	Precast concrete vault designed to separate high and low density oils that are collected against an oil-retaining baffle	Adjacent to interceptor flow-splitting MH in the north corner of site	Catchments 1-3
North Lift Station MH	Lift station MH that pumps water to storage tank	Adjacent to OWS	Catchments 1-3
Storage Tank	Provide stormwater storage and solids settlement/accumulation, discharges to treatment system	Adjacent to North Lift Station MH	Catchments 1-3
Clarus Active Disk Filtration	See Section 3.2 of this O&M Manual	Inside treatment enclosure, adjacent to storage tank	Catchments 1-3
Clarus Metals Removal System	Two-stage metal removal media	Inside treatment enclosure, adjacent to storage tank	Catchments 1-3

Stormwater runoff from Catchments 2 and 3 are re-routed to the Catchment 1 conveyance system where a weir-equipped flow-splitting manhole diverts stormwater to the treatment train. The weir is sized to divert the water quality flow rate (Q<sub>wq</sub>) and bypass large storm events. Diverted stormwater gravity flows into the OWS, then in to the North Lift Station manhole. Stormwater is then pumped from the manhole to an above ground 85,000-gallon working volume storage tank. Stormwater is discharged from the tanks at the water treatment rate, which is less than the lift station pump rate. Stormwater exits the tanks and flows to the Clarus Stormwater Treatment System. It is comprised of: (1) Disc filter system, which removes a large portion of total suspended solids, (2) cartridge filters, and (3) two-stage adsorptive metals removal media. Treated effluent is discharged to the downstream side of the splitter manhole and ultimately discharges at the Willamette River outfall.

Water used in the disc filter backwash process is conveyed to a dewatering tank. Decanted water is conveyed by gravity flow to a tee connection upstream of the OWS.

### 3 Inspection Maintenance Schedule and Procedures

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#### 3.1 Oil Water Separator

##### Within 48 hours of a Major Rain Event (*Greater than 1.0 inches in 24 hours*)

Inspect

##### Monthly

Open access doors and visually inspect for oil or sediment accumulation. If accumulation is present, pump out and dispose of at approved site.

##### Annually

Pump out vault completely and remove sediment from bottom. Refill vault with clean water and place back in service.

##### Notes:

If blockages occur, open inspection doors and determine if inlet or outlet pipes are blocked. Check for sediment accumulation on bottom of both ends. Check media plates to see if they are clogged by debris.

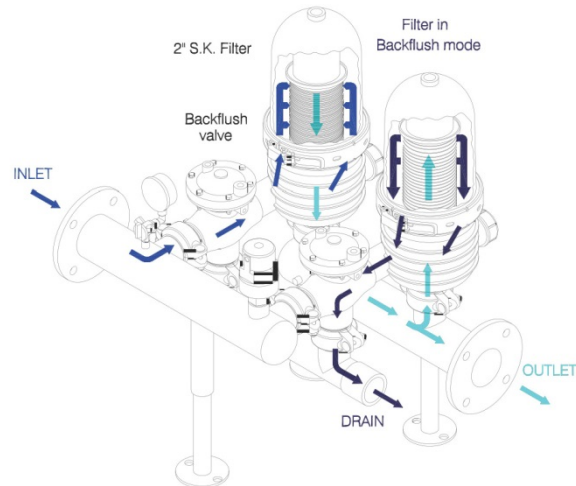
The Facet M-Pack™ Coalescing Media used in the CPS separator is designed to be cleaned in lieu of replacement. With adequate care it should last for many years. The media can be cleaned in place using an optional Cleaning Wand that attaches to a standard hose bib. Cleaning of the M-Packs is to remove blockage or sediment, not to make them “squeaky-clean”. Cleaning frequency will vary depending on nature of operations (i.e. storage area, cleaning area, etc.) Please contact a Clarus representative for additional information.

Follow all regulations concerning work in well-ventilated spaces, hazardous materials handling and disposal.

## 3.2 Clarus Active Disk Filtration

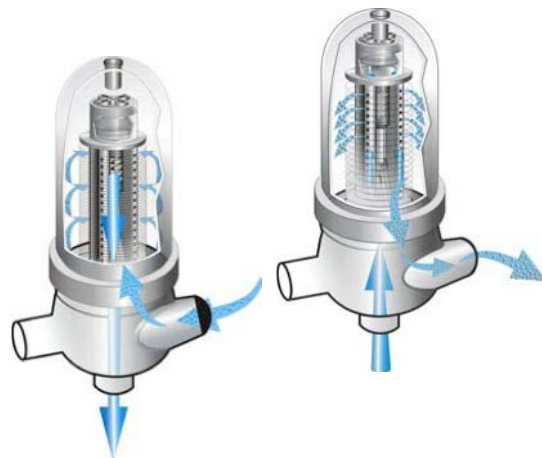
### 3.2.1 Filtration Mode

Active Filtration discs are stacked on a spine. Color coded discs with specific micron openings are stacked on a spine. This spine assembly has a spring compression unit and piston that compresses the discs together. During filtration, water flows through the inlet manifold and is distributed to the filter elements where it passes through grooves in the disks. Particles carried in the stream become lodged in the grooves but the water continues to the outlet manifold and on to the next filtration phase.



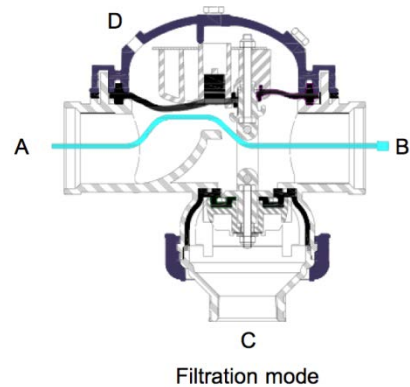
### 3.2.2 Backwashing Mode

The system senses the buildup of material and begins a series of back flush activities. Each pod is flushed individually using either water from the filter manifold or from a separate water source. During this cycle, the spine assembly spring and piston relieve the pressure on the disks. Multi-jet nozzles provide tangential spray on the loosened discs, causing them to spin, and release the retained solids. A valve arrangement allows these solids to escape to a backflush manifold where it is directed to a backflush tank. Once all the pods have been cleaned, the system returns to Filtration Mode.

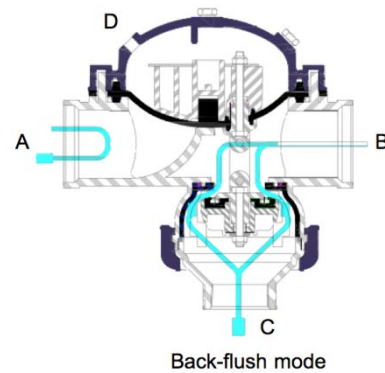


### 3.2.3 Valve Operation

Three way valves control the direction of flow on each pod. During filtration mode, water flows from port A to the Filter pod connected to port B.



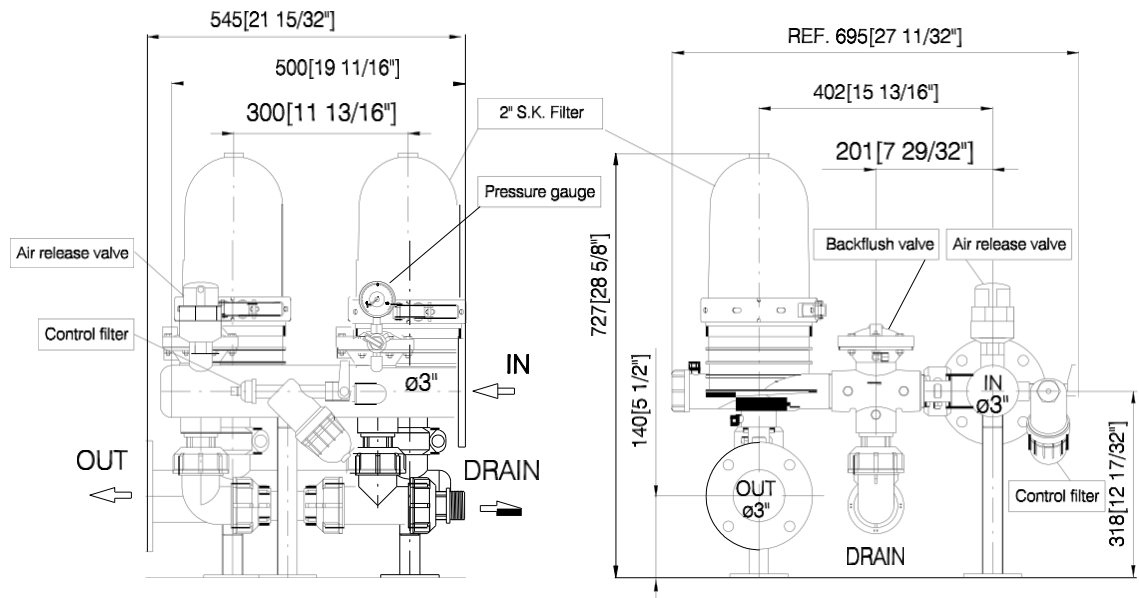
During Back-Flush Mode, the diaphragm moves down pushing the sealed body by the shaft, and Port A is closed by the seal preventing flow to the filter. Water flowing back from the filter pods exits the valve through port C and continues to the Back-Flush tank.



### 3.2.4 Technical Data

Max. Pressure	10 bar	140 psi
Min. Pressure	2.8 bar	38 psi
Backwash flow rate/unit	8m <sup>3</sup> /hr	35gpm
Max. Temp	70 °C	158 °F
pH	4-11	4-11

### 3.2.5 Typical Filter Battery



### 3.2.6 Installation

- A. Prior to start-up check for any transport damage to the unit (system operates under pressure!).
- B. This system was intended to be professionally installed. Hydraulic and electrical connections must be verified for accuracy and quality before testing the system.
- C. Flow and pressure interlocks are intended to prevent damage to the system. This manual does not contemplate operation of components without PLC guidance.

- D. Lock out all sources of power including Electrical and Hydraulic before servicing.
- E. Clamps should be inspected and properly closed before startup

### 3.2.7 Start-up Operation

**Normal Operation:** This unit has been programmed to operate with minimal operator effort. During normal conditions, startup occurs automatically.

**First startup and during all subsequent Cartridge Filter Changes:** A change filters button on the screen initiates a shutdown hold and then gradual restart of the system. Please follow all safety and operational directions on the touchscreen.

### 3.2.8 Safety

The PLC cabinet is equipped with a 440V and 110V disconnect allowing all power to be locked out before servicing. An emergency stop is available to any operator simply by pressing a button on the screen or on the panel.

### 3.2.9 Security

The PLC has three levels of security:

- **No Security.** Information regarding flows, cumulative flows, system status, cartridge filter changes and emergency stops are available without any security codes.
- **Maintenance.** Tank setpoints, flow setpoints, and some manual operation of components is possible. Troubleshooting tools are also available.
- **Installer.** Most setpoints and manual controls are available. Installer setpoints should only be changed by qualified installers.

### 3.2.10 Test and Maintenance Control

**Modes:** This system is equipped with three modes of operation:

- **OFF.** All PLC signals are OFF. Water will not flow even if the tank level is higher than the filters. The master valve on the end of the splines requires operating pressures above 15 psi to operate.
- **MANUAL.** All PLC signals are OFF unless actuated individually from the touch screen. This screen should only be used during installation and troubleshooting. Operational interconnects are bypassed so abnormal flow patterns are possible. Most safety interconnects cannot be bypassed.
- **AUTOMATIC.** All PLC signals follow the logic of the system. The unit is intended to rest until there is enough water to process. Once processing starts, the unit monitors

pressures and water levels and adjusts pump speeds, flow patterns and cleaning patterns to optimize operation.

### 3.3 Spin Klin – System Maintenance

#### 3.3.1 Monthly Maintenance

- Check inlet /outlet pressures:
- Check for leakages from the drain manifold:
  - In case there is a leakage of water during the filtration stage, check for possible failure at the backwash valve seals.
- Backwash controller performance:
- Cleaning of the Command Filters:

Close the command filter inlet valve, release the pressure trapped at the command filter, remove the cover. Thoroughly clean the filtration element and then reinstall the command filter element and cover, then open the inlet valve. Each battery will have its own command filter.

**Winterization:** In order to prevent the filter battery becoming damaged during extended dry periods during freezing weather drain all the water from the filter battery and the command filter and leave the drain valve open.

#### 3.3.2 Seasonal Maintenance - Cleaning the Discs

When manual cleaning of the discs is required, please follow the steps described below:



- Make sure that system is not under pressure! Release the clamp and remove the cover. (Figure 1)
- Unscrew the butterfly-nut on the filtration element. (Figure 2)
- Remove the tightening cylinder. (Figure 3)

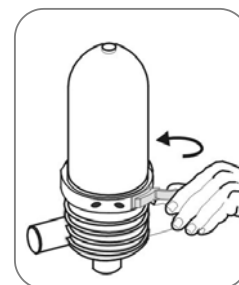
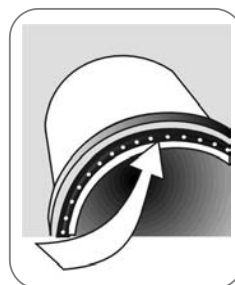
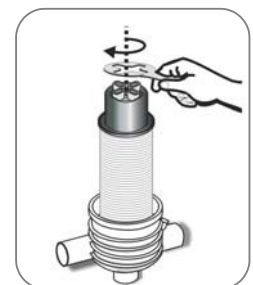
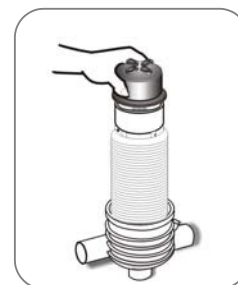
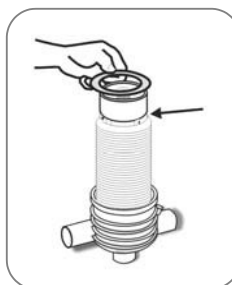
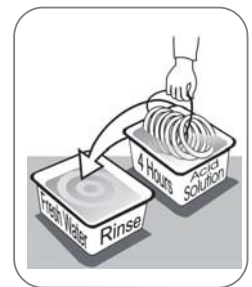
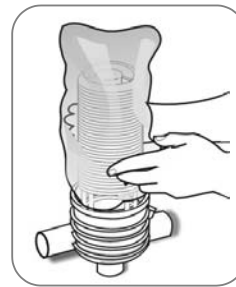
Remove the discs (for convenience we recommend using a plastic bag) (Figure 4,5). Tie each set on a string and place them in a cleaning solutions (HCL, Chlorine, or other) refer to “Cleaning Recommendations Clogged Filtration Discs”.

Thoroughly wash the discs with fresh water and then reassemble the discs on the spines. (Figure 6)

Check that the correct quantities of discs are assembled on the spine: when the discs are pressed with two hands, the top disc should be level with the imprinted circle on the outside of the spine. (Figure 7)

Put on the tightening cylinder and tighten the butterfly-nut, (Figure 8,9)

Reassemble the filter cover and tighten the clamp. (Figure 10, 11)



### 3.4 Cleaning Recommendations for Clogged Filtration Discs

Water-formed deposits may cause clogging of the filter discs. The formation of these deposits depends on the quality of the filtered water and environmental conditions like temperature, pH, light, duration of filtration and more.

#### 3.4.1 Common water-formed deposits are:

- Biological or organic deposits (mostly mucous or oily to the touch, beige, brown or green in color)
- Iron oxide (rust) or other metal oxides
- Carbonates (white or gray deposit)
- Combinations of the above

If these deposits cannot be eliminated by pretreatment of the water, we recommend the following cleaning procedure:

#### 3.4.2 Material and Equipment

- A well ventilated working place.
- 2 small containers (1 liter), 2 large containers (15 liter) and a stirring stick, all resistant to chemicals, preferably of polypropylene.
- Plastic rope to tie up the disc.
- Sodium Hypochlorite NaOCl - Strong oxidizing liquid, commercial concentration: 10%. Oxidizes and removes organic and biological deposits.
- Hydrochloric Acid HCl - Very corrosive liquid, commercial concentration: 30%. Dissolves and removes carbonates, iron oxide, and other deposits.
- Safety equipment: safety glasses, gloves, long pants, long sleeved shirt and shoes.

#### 3.4.3 Safety

While working with chemicals protect yourself with the necessary safety equipment:

- Safety glasses, gloves, protective clothing
- Work in a well ventilated area
- Follow the manufacturer's instructions

### 3.4.4 Cleaning Organic and Biological Deposits

- Open the filter and remove dirty discs.
  - **Attention** – Never open the filter before the pressure has been released!
- Arrange the discs loosely on the plastic rope
- Prepare a 5% Sodium Hypochlorite solution:
  - 1) Pour 5 liters of water into one of the large containers.
  - 2) Add 5 liters of Sodium Hypochlorite (10%) into the water.
- Soak the discs in the solution so that both sides are covered. To achieve maximum cleaning, agitate the discs several times with a stirring stick.
- Contact time with cleaning solution: up to 8 hours
- Remove the discs carefully from the solution, put them in the second large container and rinse them very well with clean water before placing them back in the filter
- We recommend flushing the cleaned discs again in the filter to ensure that all chemical residues are removed.

The cleaning solution can be used for several sets of discs. As the cleaning activity of the solution deteriorates, it may be necessary to soak the discs for a longer time.

### 3.4.5 Cleaning Carbonates and Iron Deposits

- Open the filter and remove the dirty discs.
- Arrange the discs loosely on the plastic rope.
- Prepare a 5% Solution of Hydrochloric Acid:
  - 1) Pour 10 liters of water into one of the large containers.
  - 2) Carefully add 2 liters of Hydrochloric Acid (30%) into the water. Soak the discs in the solution so that both sides will be covered. PLEASE NOTE: Carbonates react violently with hydrochloric acid (foaming, gas evolution).

To achieve maximum cleaning, agitate the discs several times with a stirring stick.

- Contact time with cleaning solution: 1 - 8 hours.
- Remove the discs carefully from the solution and rinse them well with clean water before placing them back in the filter.
- We recommend flushing the cleaned discs again in the filter to ensure that all chemical residues are removed.

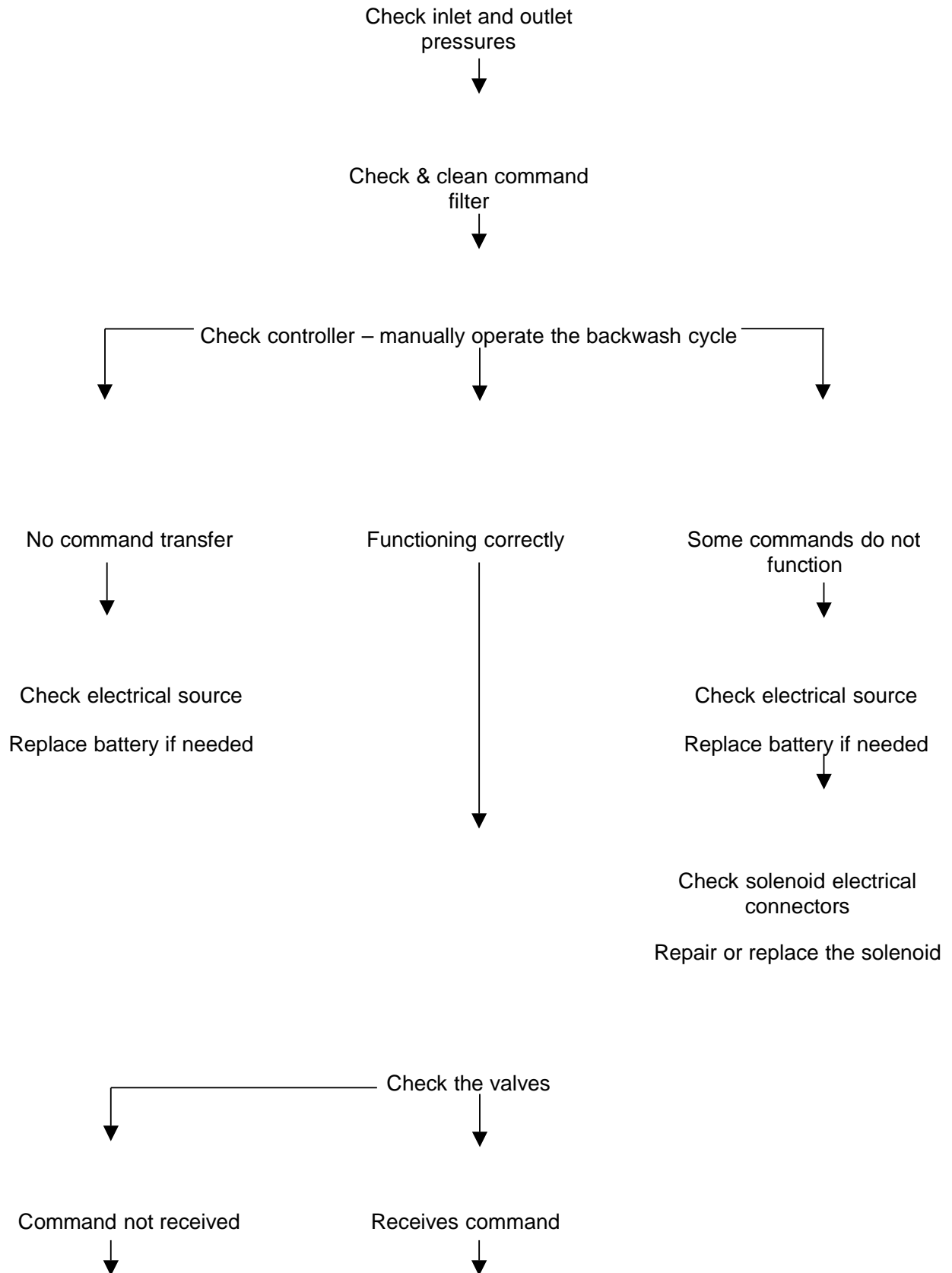
The cleaning solution can be used for several sets of discs. It may be necessary to soak the discs for a longer period of time as the cleaning activity of the solution deteriorates.

### 3.4.6 Cleaning Complex Deposits

If the composition of the deposit is not known, perform the following test:

- Take 5 discs for the test.
- Soak 2 discs in a 5% Sodium Hypochlorite Solution.
  - Preparation of the solution:
  - Pour 1 cup of water into a small container, then add 1 cup of Sodium Hypochlorite (10% NaOCl).
- Soak 2 discs in a 5% Hydrochloric Acid Solution.
  - Preparation of the solution:
  - Pour 2½ cups (= 500ml) of water into a small container, then add carefully ½ cup (= 100ml) of Hydrochloric Acid (30% HCl).
- Keep one disc as a control.
- Observe the cleaning process:
  - If one of the solutions removes all of the deposit, clean the discs in that solution according to the instructions above
  - If neither solution removes the deposit completely, continue with the test procedure.
- Remove the discs from both solutions, rinse them well with water and soak them in the second solution: put the two discs, which have been in the Sodium Hypochlorite Solution, in the Hydrochloric Acid Solution, and the other way round.
- Check the cleaning process:
  - If one of the treatments removes all of the deposit, clean all of the discs following the same two-step procedure in the exact same order. Rinse the discs well between the two cleaning processes.
  - If the deposit hasn't been completely removed, send a set of untreated discs to the laboratory for further examination

### 3.5 No Backwash Operation



Check the water supply  
control tube

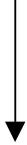
Remove the valve's cover Check the  
diaphragm and the piston Replace if  
needed



Check & clean the drain  
manifold and pipe

### 3.6 Continuous or Non-stop Backwashing

Continuous backwash



Disconnect the control  
pipes from the valves



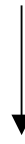
Non stop backwash cycle



Check inlet / outlet pressure

Check pressure differential gauge and replace if needed

Check controller described above

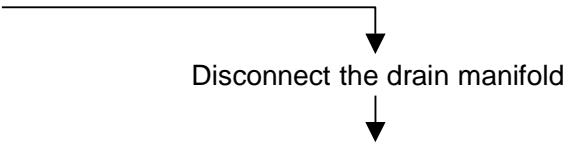


Contact your local distributor

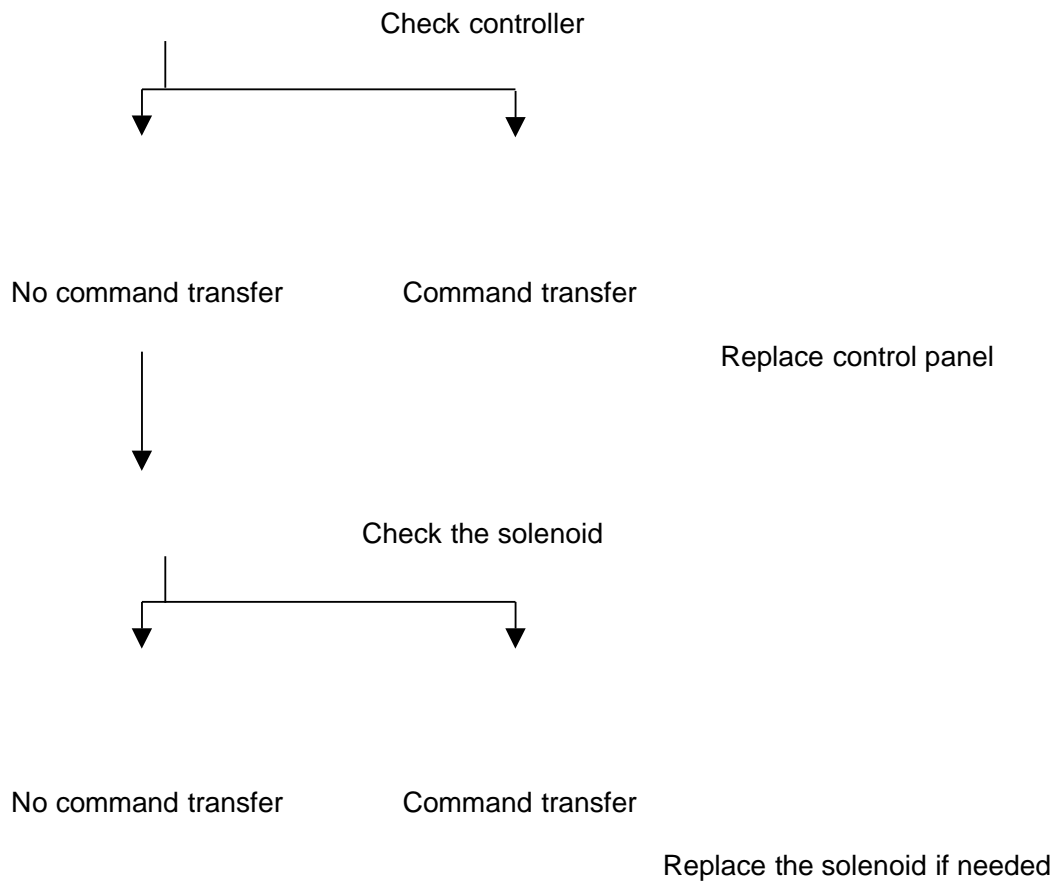
Command transfer



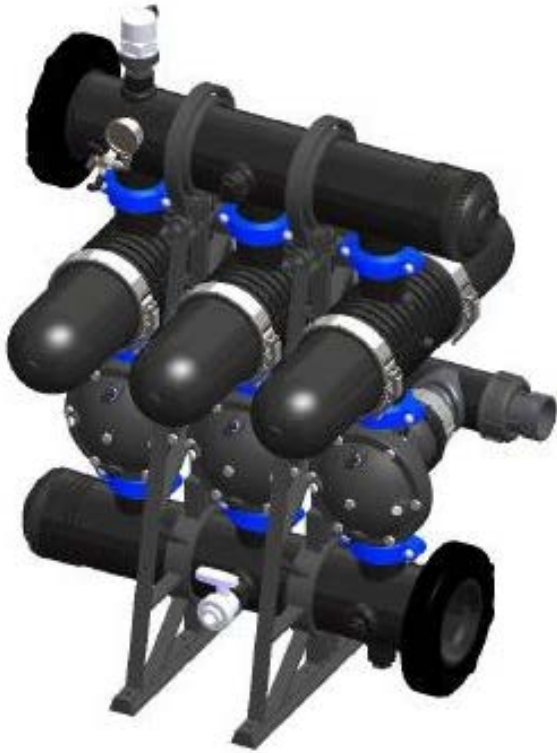
No command  
transfer



Disconnect the drain manifold

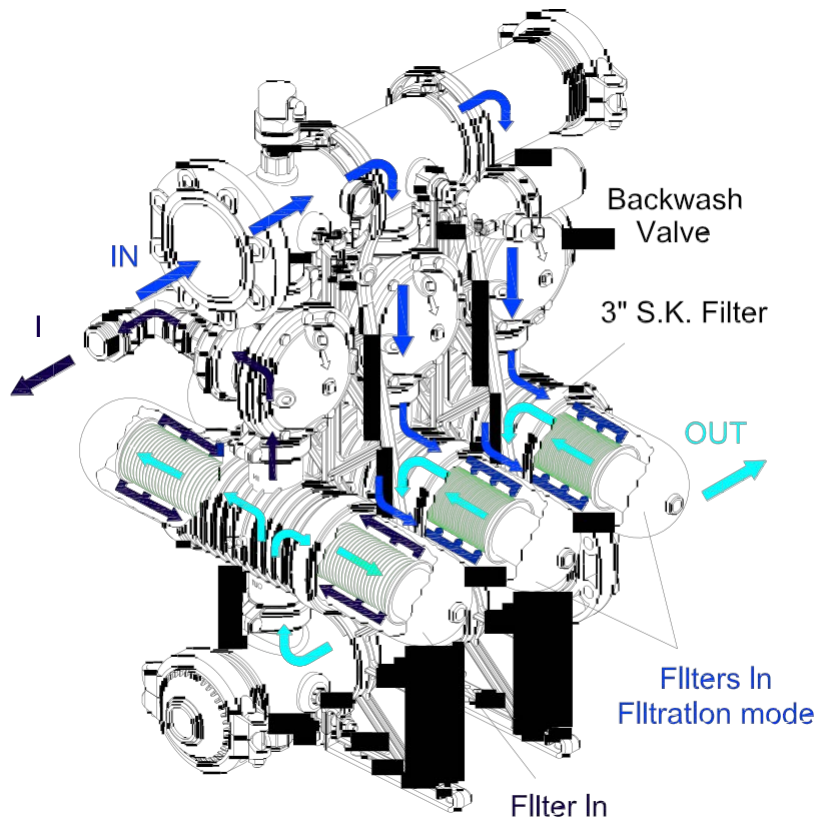


- Locate the nonfunctioning valve. Remove any obstruction. Repair



- Operation

- During the filtration stage, water flows through the INLET manifold and is distributed through the 3" x 2" backwash valves into the Stay Kleen filters.
- The water then passes through the filter elements to the outlet manifold for consumer use.



### 3.7 Backwash Mode

#### Description of the Backwashing Process

1. The controller transmits an electrical command to the first solenoid according to either differential pressure or time.
2. The solenoid then sends a pressure command to the backwash valve, moving it from the filtration mode to the backwash mode.
3. Filter #1 is then backwashed with water from the outlet manifold that has been filtered by the other filters in the system. Contaminated water and impurities flow out through the drain manifold.
4. On completion of the allotted backwashing time, the controller releases the backwash command, and filter #1 returns to the filtration mode.
5. Filter #2 then enters the backwash mode, and the process is repeated until all the filters in the system have been backwashed.
6. After all the filters have been backwashed the system returns to the filtration mode, until the next backwash cycle.

### 3.3 Clarus Metal Removal System

The maintenance and replacement of media should be coordinated by the authorized Clarus Representative.

Regular operational monitoring of the polisher vessels will assure uninterrupted operation.

- Polisher Vessel monitoring
  - It is important to take readings regularly to monitor performance of the system. Changes in performance are indications that the system vessels need regeneration. It is important to establish a baseline of readings that represent normal performance in order to detect changes in performance that signal the need for cleaning. Important parameters are:
    - Feed water and effluent conductivity.
    - Feed flow rate for system during operation.
    - Pressure before, between, and after vessels.
    - Temperature.
    - Zinc and Iron feed & effluent levels.
    - pH of feed vessel and effluent.

### 3.4 Limited Warranty

CLARUS FILTRATION SYSTEMS ("CLARUS FILTRATION SYSTEMS") Warrants to the original end user ("CUSTOMER") who purchased CLARUS FILTRATION SYSTEMS products directly from Clarus or one of its authorized distributors, that such products will be free from defect in material and/or workmanship for the term set forth below, provide that such products are properly installed, used and maintained in accordance with CLARUS FILTRATION SYSTEMS instructions, written or verbal.

Should such products prove defective within one year from the original purchase date by the customer, and subject to receipt by CLARUS FILTRATION SYSTEMS or its authorized representative, of written notice thereof from the customer within 30 days of discovery of such defect or failure - CLARUS FILTRATION SYSTEMS will repair or replace, at its sole discretion, any item proven to be defective.

CLARUS FILTRATION SYSTEMS shall not be liable, nor does this warranty extend to any consequential or incidental damages or expenses of any kind or nature, regardless of the nature thereof, including without limitation, injury to persons or property, loss of use of the products, loss of goodwill, loss of profits or any other contingent liabilities of any kind or character alleged to be the cause of loss or damage to the purchaser.

This warranty does not cover damage or failure caused by misuse, abuse or negligence, nor shall it apply to such products upon which repairs or alterations have been made by other than an authorized CLARUS FILTRATION SYSTEMS representative.

This warranty does not extend to components, parts or raw materials used by CLARUS FILTRATION SYSTEMS but manufactured by others, which shall be only to the extent warranted by the manufacturer's warranty.

No agents or representatives shall have the authority to alter the terms of this warranty nor to add any provisions to it not contained herein or to extend this warranty to anyone other than CLARUS FILTRATION SYSTEMS customers.

THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, EXCEPT THIS WARRANTY WHICH IS GIVEN IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE



# APPENDIX C

## PREVENTIVE MAINTENANCE PROCEDURES

TUBE FORGINGS OF AMERICA  
**STORM WATER QUALITY DATA SUMMARY**

MONTHLY CHECK LIST

DATE CHECKED \_\_\_\_\_ CHECKED BY \_\_\_\_\_

Manhole /CB #	Floating Solids		Debris		Color or Foam		Oil or Grease Sheen		Action Taken
	OK	Problem	OK	Problem	OK	Problem	OK	Problem	
C-1									
C-2									
C-3									
C-4									
C-5									
1									
2									
3									
4									
5									
6									
7									
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17									
18									
19									
20									
21									
22									
23									

**Reviewed By**

**Maint. Manager:**

**Date:**

**Maint. Foreman:**

**Date:**

Approved By: Kim Rowley  
 Rev. 12/19/2014

# PREVENTIVE MAINTENANCE INSPECTION CHECK SHEET

Facility Name: **TUBE FORGINGS OF AMERICA, INC**

Facility Location **5200 N.W. FRONT AVE; PORTLAND, OR 97210**

YEAR:

Inspection Point	Inspection Date											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Propane Refueling Station												
Hydraulic&Lube Oil Storage Area												
Drum Storage Area												
Lube Pit												
Unpaved Storage Areas												
Super 76 Baghouse												
Inline Blast Baghouse												
Super 70 Baghouse												
Blast Room Baghouse												
Raw Metal Storage Area												
Finished Product Storage Area												
Scrap Metal Storage Area												
OWS Holdings Tanks												
*Full plan review and complete site inspection												
Authorized Representative:				Title:				Date:				

Reviewed By  
 Maint. Manager:  
 Maint. Foreman

Date:  
 Date:

Approved By: Kim Rowley  
 Rev. 10/05/2009

# APPENDIX D

## SPILL REPORT AND GENERAL SPILL RESPONSE PROCEDURES

## GENERAL SPILL RESPONSE PROCEDURES

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*In the event of a spill of hazardous materials, follow these basic spill response procedures:*

- Small spills should be managed on-site with absorbent booms or pads that can contain and soak up liquid on impervious surfaces.
- Larger spills should be managed by placing a temporary containment device (e.g., absorbent boom, pad or dike) at a strategic down gradient location to protect the nearest stormwater conveyance structures (e.g., drainage channel, catch basin, sediment trap).
- If the spill is on grass or soil, absorbent should be used to cover the spill immediately, while cleanup alternatives are evaluated.
- The Site Safety Officer should assess the contained material and direct the appropriate cleanup and disposal procedures.
- Prevent the spilled material from spreading to other areas of the site. If appropriate, temporarily stop pertinent facility operations to reduce the potential for further adverse impact to stormwater.
- Absorbent used to control and collect spilled materials should be placed into plastic bags. The bags should be placed in sludge tubs inside the building and properly labeled.
- Equipment used to respond to spills should be maintained on site in the maintenance area. The equipment should be used for emergency spill response only, and should be decontaminated or replaced immediately after each spill response.
- The safety manager should review the cause of the incident, the response actions, the cleanup, and other pertinent issues or circumstances. The information will be used to evaluate the emergency procedures, training requirements, and institutional controls that may need modification to reduce the potential of such incidents to recur.

# SPILL NOTIFICATION RECORD

Name: \_\_\_\_\_ Telephone: \_\_\_\_\_

Facility Address: \_\_\_\_\_

EPA I.D. Number: \_\_\_\_\_

Incident Time: \_\_\_\_\_ Date: \_\_\_\_\_ Duration: \_\_\_\_\_

Incident Type (i.e. spill, leak, etc.) \_\_\_\_\_

Quantity and type of material spilled: \_\_\_\_\_

Number of persons, if any, exposed or injured: \_\_\_\_\_

Potential off-site hazards to human health and the environment: \_\_\_\_\_

Spill controlled on site: Yes: \_\_\_\_\_ No: \_\_\_\_\_

If not, please explain: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Spill control measures: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Notifications: Site Safety Officer Yes \_\_\_\_\_ No \_\_\_\_\_

Outside Agencies Yes \_\_\_\_\_ No \_\_\_\_\_

List agencies contacted: \_\_\_\_\_

\_\_\_\_\_

D-1

Rev 1.0 - 12/14/06

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